LG

LG-200
SERVICE MANUAL

Table Of Contents

1. PERFORMANCE 2
- 1-1. HW Features 2
- 1-2. Memory Requirment 2
- 1.3. Technical Specification 3
- 1-4. GSM band RF Specifications 7
- 1-5. DCS band RF Specifications 8
- 1-6. Receiver (GSM) 9
- 1-7. Receiver (DCS) 9

2. TECHNICAL BRIEF 10
- 2-1. Receiver 10
- 2-2. Transmitter 14
- 2-3. The PA Circuit and its Control 17
- 2-4. 13 MHz Clock 18
- 2-5. Main Processor and DSP 19
- 2-6. Power Supplies and Control Signals 21
- 2-7. User Interface Board 28
- 2-8. Testing Set-up and Checking Signals 32
- 2-9. Dimensions of Main Components. 43

3. TROUBLE SHOOTING 53
- 3-1. Power Supply Failure 53
- 3-2. Voice Function Failure 55
- 3-3. Display Function Failure 55
- 3-4. Transmission & Receiving Failure 57
- 3-5. Other Function Failure 57

4. TEST POINT DATA 60

5. ASSEMBLY INSTRUCTIONS 68

6. BLOCK DIAGRAM 73

7. CIRCUIT DIAGRAM 74

8. HOW TO DOWNLOAD S/W 83

9. HOW TO PROCESS CALIBRATION 84

10. EXPLODED VIEW 90

11. REPLACEMENT PARTS LIST 91

1. PERFORMANCE

1-1. HW Features

Item	Feature	Comment
Battery	Li-Ion Battery, 600mAh Size : 105.9x44.8x19.7mm Weight : 89g, 77cc PCB : M/B:99.5x38.3;K/B:99.5x39.4mm	
AVG TCVR current(mA)	GSM Imax(390mA),DCS Imax(320mA)	
Stand by current(mA)	≦ 5mA	
- Talk time - Stand by time - Charging time	2.5-hour (GSM Tx Level_7) 85-hour(Paging Period:2 RSSI:-85dBm) 1.5-hour	
RX sensitivity	GSM:-107dBm, DCS:-104dBm	
TX output power	GSM (Level 5:33dBm), DCS (Level0: 30dBm)	
GPRS compatibility	N/A	
SIM card type	3v/5v small	
Display	128x64	
Status Indicator	Soft Icons Keypad : 0-9, #, *, C, P/book, up/down, on/off	
ANT	External System connector : N/A	
Ear Phone Jack	Yes	
PC synchronization	N/A Memory : 1MB	
Speech coding	EFR/FR	
Data & Fax	N/A	
Vibrator	Yes	
Melody(for Buzzer Function)	22	
Voice Recording	N/A	
C-Mike	N/A	
Receiver	Yes	
Speaker Phone	N/A	
Portable Handsfree	Yes, option	
Travel Adapter	Yes	Switching
Options		

1-2. Memory Requirment

Application	RAM Size	ROM Size
GSM Protocol	120KB	880KB
WAP (AUR Browser)	N/A	N/A
Zi ezText (2 Languages at the same time)	N/A	N/A
ART	N/A	N/A
Voice Memo (3 Minutes)	N/A	N/A
Phone Book	1KB	2KB
Voice Tag	N/A	N/A
Game & Accessory	3K	20K
GPRS	N/A	N/A

1-3. Technical Specification

<table>
<tr><th>Item</th><th>Description</th><th colspan="3">Specification</th></tr>
<tr><td>1</td><td>Frequency Band</td><td colspan="3"><u>GSM900 band</u>
Tx : 890 + n*0.2 MHz
Rx : 935 + n*0.2 MHz
(n = 1 ~ 124)

<u>GSM1800 band</u>
Tx : 1710 + (n-512)*0.2
Rx : 1805 + (n-512)*0.2
(n = 512 ~ 885)</td></tr>
<tr><td>2</td><td>Phase error</td><td colspan="3">RMS < 5 degrees
Peak < 20 degrees</td></tr>
<tr><td>3</td><td>Frequency error</td><td colspan="3">< 0.1ppm : = 90 Hz (for GSM900) or 180 Hz (for GSM1800)</td></tr>
<tr><td rowspan="22">5</td><td rowspan="22">Power Level</td><td colspan="3">GSM900</td></tr>
<tr><td>Control Level</td><td>Power Level</td><td>Tolerance</td></tr>
<tr><td>5</td><td>33 dBm</td><td>± 2dB</td></tr>
<tr><td>6</td><td>31 dBm</td><td>± 3dB</td></tr>
<tr><td>7</td><td>29 dBm</td><td>± 3dB</td></tr>
<tr><td>8</td><td>27 dBm</td><td>± 3dB</td></tr>
<tr><td>9</td><td>25 dBm</td><td>± 3dB</td></tr>
<tr><td>10</td><td>23 dBm</td><td>± 3dB</td></tr>
<tr><td>11</td><td>21 dBm</td><td>± 3dB</td></tr>
<tr><td>12</td><td>19 dBm</td><td>± 3dB</td></tr>
<tr><td>13</td><td>17 dBm</td><td>± 3dB</td></tr>
<tr><td>14</td><td>15 dBm</td><td>± 3dB</td></tr>
<tr><td>15</td><td>13 dBm</td><td>± 3dB</td></tr>
<tr><td>16</td><td>11 dBm</td><td>± 5dB</td></tr>
<tr><td>17</td><td>9 dBm</td><td>± 5dB</td></tr>
<tr><td>18</td><td>7 dBm</td><td>± 5dB</td></tr>
<tr><td>19</td><td>5 dBm</td><td>± 5dB</td></tr>
<tr><td colspan="3">GSM1800</td></tr>
<tr><td>Control Level</td><td>Power Level</td><td>Tolerance</td></tr>
<tr><td>0</td><td>30 dBm</td><td>2dB</td></tr>
<tr><td>1</td><td>28 dBm</td><td>± 3dB</td></tr>
<tr><td>2</td><td>26 dBm</td><td>± 3dB</td></tr>
<tr><td>3</td><td>24 dBm</td><td>± 3dB</td></tr>
<tr><td>4</td><td>22 dBm</td><td>± 3dB</td></tr>
<tr><td>5</td><td>20 dBm</td><td>± 3dB</td></tr>
<tr><td>6</td><td>18 dBm</td><td>± 3dB</td></tr>
<tr><td>7</td><td>16 dBm</td><td>± 3dB</td></tr>
<tr><td>8</td><td>14 dBm</td><td>± 3dB</td></tr>
<tr><td>9</td><td>12 dBm</td><td>± 4dB</td></tr>
<tr><td>10</td><td>10 dBm</td><td>± 4dB</td></tr>
<tr><td>11</td><td>8 dBm</td><td>± 4dB</td></tr>
<tr><td>12</td><td>6 dBm</td><td>± 4dB</td></tr>
<tr><td>13</td><td>4 dBm</td><td>± 4dB</td></tr>
<tr><td>14</td><td>2 dBm</td><td>± 5dB</td></tr>
<tr><td>15</td><td>0 dBm</td><td>± 5dB</td></tr>
</table>

Item	Description	Specification	
6	Spectrum due to modulation	**GSM900**	
		Offset from Carrier(KHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600 ~ <1200	-60
		1200 ~ <1800	-60
		1800 ~ <3000	-63
		3000 ~ <6000	-65
		≧ 6000	-71
		GSM1800	
		Offset from Carrier(KHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600 ~ <1200	-60
		1200 ~ <1800	-60
		1800 ~ <3000	-65
		3000 ~ <6000	-65
		≧ 6000	-73
7	Spectrum due to switching transient	**GSM900**	
		Offset from Carrier(KHz).	Max. dBc(KHz).
		400	-19
		600	-21
		1200	-21
		1800	-24
		GSM1800	
		Offset from Carrier(KHz).	Max. dBc
		400	-22
		600	-24
		1200	-24
		1800	-27
8	Spurious emissions	Conduction, Emission Status, Appendix 1 Conduction, Emission Status, Appendix 2	
9	Bit Error Rate	**GSM900** BER(Class II) <2.439% @-102dBm **DCS1800** BER(Class II) <2.439% @-100dBm	

<table>
<tr><th>Item</th><th>Description</th><th colspan="4">Specification</th></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Rx Level Report accuracy</td><td>GSM900</td><td>GSM1800</td><td colspan="2"></td></tr>
<tr><td>≧ -88
≧ -101
< -101</td><td>≧ -86
≧ -99
< -99</td><td>2
3
4</td><td>2
2
2</td></tr>
<tr><td>11</td><td>SLR</td><td colspan="4">8 ± 3 dB</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Sending Response</td><td>Frequency (Hz)</td><td>Max.(dB)</td><td colspan="2">Min.(dB)</td></tr>
<tr><td>100
200
300
1,000
2,000
3,000
3,400
4,000</td><td>-12
0
0
0
4
4
4
0</td><td colspan="2">/
/
-12
-6
-6
-6
-9
/</td></tr>
<tr><td>13</td><td>RLR</td><td colspan="4">2 ± 3 dB</td></tr>
<tr><td rowspan="2">14</td><td rowspan="2">Receiving Response</td><td>Frequency (Hz)</td><td>Max.(dB)</td><td colspan="2">Min.(dB)</td></tr>
<tr><td>100
200
300
500
1,000
3,000
3,400
4,000</td><td>-12
0
2
*
0
2
2
2</td><td colspan="2">/
/
-7
-5
-5
-5
-10
/</td></tr>
<tr><td colspan="5">* Mean that Adopt a straight line in between 300Hz& 1,000Hz to be Max. level in the range.</td></tr>
<tr><td>15</td><td>STMR</td><td colspan="4">13 ± 5 dB</td></tr>
<tr><td>16</td><td>Stability Margin</td><td colspan="4">> 6 dB</td></tr>
<tr><td rowspan="2">17</td><td rowspan="2">Distortion</td><td colspan="3">dB to ARL (dB)</td><td>Level Ratio (dB)</td></tr>
<tr><td colspan="3">-35
-30
-20
-10
0
7
10</td><td>17.5
22.5
30.7
33.3
33.7
31.7
25.5</td></tr>
<tr><td>18</td><td>Sidetone Distortion</td><td colspan="4">Three stage distortion < 10%</td></tr>
<tr><td>19</td><td><Change> System frequency (13MHz) tolerance</td><td colspan="4">≦ 2.5ppm</td></tr>
<tr><td>20</td><td><Change>32.768KHz tolerance</td><td colspan="4">≦ 30ppm</td></tr>
</table>

Item	Description	Specification	
21	Power consumption	Full power: < 390mA (GSM) ; < 320mA (DCS) Standby : 1. Normal '≦ 5mA(Mix. power) 2. Using Test mode on DSP Sleep function ≦ 6mA	
22	Talk time	GSM/ Level_7 (Battery Capacity 650mA): 130Min GSM/ Level_7 (Battery Capacity 600mA): 120Min	
23	Standby time	Under conditions, at least 85 hours: 1. Brand new and full 600mAh battery 2. Full charge, no receive/send and keep GSM in idle mode. 3. **Broadcast** set off. 4. Signal strength display set at 3 level above. 5. **Backlight** of phone set off.	
24	Ringer Volume	At least 70dB under below conditions: 1. Ringer set as ringer 7. 2. Test distance set as 50 cm	
25	Charge Voltage	Fast Charge: < 600 mA Slow Charge: < 100 mA	
26	Antenna display	GSM	DCS
		≧ -84dBm ≧ -89dBm ≧ -94dBm ≧ -101dBm ≧ -105dBm Tolerance: ± 2 dB	-80dBm : 4 -85dBm : 3 -90dBm : 2 -97dBm : 1 -101dBm : 0
27	Battery indicator	Level	Voltage (v)
		0 1 2 3 4 Tolerance: ± 0.1V	V ≦ 3.5V 3.5 ≦ V ≦ 3.7 3.7 ≦ V ≦ 3.8 3.8 ≦ V ≦ 4.0 4.0 ≦ V
28	Low Voltage Warning	3.5V ± 0.1V	
29	Forced shut down Voltage	3.3V ± 0.1V	
30	Battery Type	1 Li-Ion battery Standard Voltage = 3.7V Battery full charge voltage =4.2V Capacity: 650mAh/600mAh (Li-Ion);	
31	Travel Charger	**Linear Charger** In put: 110V or 240 VAC, 50/60Hz Out put: 5VDC ± 0.25V, 500mA (No Load) **Switching-mode charger** In put: 96- 246VAC, 50/60Hz Out put: 5VDC ± 0.25V, 500mA (No Load)	

1-4. GSM band RF Specifications

Frequency Stability	< ± 90Hz
RF Maximum Power Output	33dBm
RF Output Power Levels	15, decrementing in 2dB steps
Power Control Level 5	33dBm ± 2dB
Power Control Level 6	31dBm ± 3dB
Power Control Level 7	29dBm ± 3dB
Power Control Level 8	27dBm ± 3dB
Power Control Level 9	25dBm ± 3dB
Power Control Level 10	23dBm ± 3dB
Power Control Level 11	21dBm ± 3dB
Power Control Level 12	19dBm ± 3dB
Power Control Level 13	17dBm ± 3dB
Power Control Level 14	15dBm ± 3dB
Power Control Level 15	13dBm ± 3dB
Power Control Level 16	11dBm ± 5dB
Power Control Level 17	9dBm ± 5dB
Power Control Level 18	7dBm ± 5dB
Power Control Level 19	5dBm ± 5dB
TX Frequency Output	
Low Channel (Ch 1)	890.2 MHz
Mid Channel (Ch 62)	902.4 MHz
High Channel (Ch 124)	914.8 MHz
TX Frequency Calculation (F_{tx})	890 + (ARFCN x 0.2) = F_{tx} MHz
TX UHF VCO Frequency	
Low Channel (Ch 1)	1160.2 MHz
Mid Channel (Ch 62)	1172.4 MHz
High Channel (Ch 124)	1184.8 MHz
TX UHF VCO Freq. Calculation (F_{tuhf})	Ftx + 270 = F_{tuhf} MHz
IF VCO Frequency	540 MHz
TX IF Frequency	270 MHz
Rx IF Frequency	270MHz
Phase Error	
Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees

1-5. DCS band RF Specifications

Frequency Stability	< ± 180Hz
RF Maximum Power Output	30dBm
RF Output Power Levels	16, decrementing in 2dB steps
Power Control Level 0	30dBm ± 2dB
Power Control Level 1	28dBm ± 3dB
Power Control Level 2	26dBm ± 3dB
Power Control Level 3	24dBm ± 3dB
Power Control Level 4	22dBm ± 3dB
Power Control Level 5	20dBm ± 3dB
Power Control Level 6	18dBm ± 3dB
Power Control Level 7	16dBm ± 3dB
Power Control Level 8	14dBm ± 4dB
Power Control Level 9	12dBm ± 4dB
Power Control Level 10	10dBm ± 4dB
Power Control Level 11	8dBm ± 4dB
Power Control Level 12	6dBm ± 4dB
Power Control Level 13	4dBm ± 4dB
Power Control Level 14	2dBm ± 5dB
Power Control Level 15	0dBm ± 5dB
TX Frequency Output	
Low Channel (Ch 512)	1710.2 MHz
Mid Channel (Ch 699)	1747.6 MHz
High Channel (Ch 885)	1784.8 MHz
TX Frequency Calculation (F_{tx})	1710.2 + (ARFCN x 0.2) = Ftx MHz
TX UHF VCO Frequency	
Low Channel (Ch 1)	1530.2 MHz
Mid Channel (Ch 62)	1567.6 MHz
High Channel (Ch 124)	1604.8 MHz
TX UHF VCO Freq. Calculation (F_{tuhf})	F_{tx} + 180 = F_{tuhf} MHz
IF VCO Frequency	540 MHz
TX IF Frequency	180 MHz
Rx IF Frequency	270MHz
Phase Error	
Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees

1-6. Receiver (GSM)

RX Frequency Input	
Low Channel (Ch 1)	935.2 MHz
Mid Channel (Ch 62)	947.4 MHz
High Channel (Ch 124)	959.8 MHz
RX Frequency Calculation (F_{rx})	935 + (ARFCN x 0.2) = F_{rx} MHz
RX UHF VCO Frequency	
Low Channel (Ch 1)	1160-1230 MHz
Mid Channel (Ch 62)	1205.2 MHz
High Channel (Ch 124)	1217.4 MHz
RX UHF VCO Freq. Calculation (F_{ruhf})	1229.8 MHz F_{rx} + 270 = F_{ruhf} MHz
RX VCO Frequency	540 MHz
Demodulation Frequency	270 MHz (540/ 2)
IF Frequency	270 MHz
BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm Type II BER <0.1% at -15dBm

1-7. Receiver (DCS)

RX Frequency Input	
Low Channel (Ch 1)	1805.2 MHz
Mid Channel (Ch 62)	1842.6 MHz
High Channel (Ch 124)	1879.8 MHz
RX Frequency Calculation (F_{rx})	Ftx + 95 Mhz = F_{rx} MHz 1535-1610 MHz
RX UHF VCO Frequency	
Low Channel (Ch 1)	1535.2MHz
Mid Channel (Ch 62)	1572.6 MHz
High Channel (Ch 124)	1609.8 MHz
RX UHF VCO Freq. Calculation (F_{ruhf})	F_{rx} - 270 = F_{ruhf} MHz
RX VCO Frequency	540 MHz
Demodulation Frequency	270 MHz (540/ 2)
IF Frequency	270 MHz
BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm Type II BER <0.1% at -15dBm

2. TECHNICAL BRIEF

2-1. Receiver

1. The front end

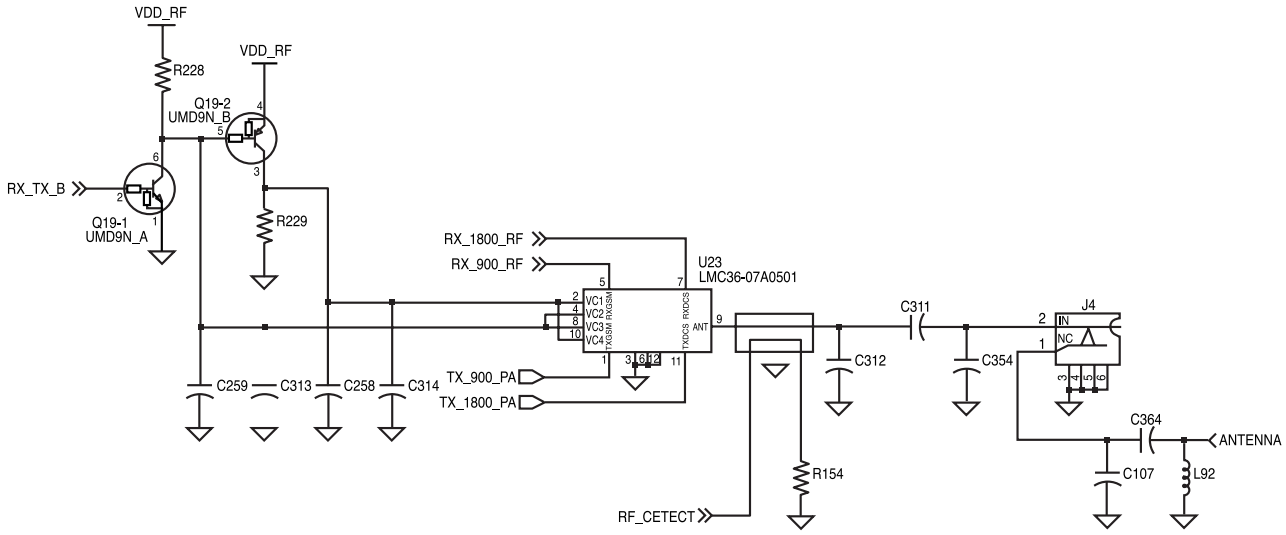
The RF receive signal (GSM 935Mhz - 960MHz, DCS 1805Mhz - 1880Mhz) is input via the antenna or coaxial connector. An antenna matching circuit is between the antenna and the connector.

The diplexer U23 is used to control the Rx and Tx paths. And the input signal RX_TX_B of pin 2 of Q19 is connected to U1(SC1688) to switch either Rx or Tx path on. When the Rx path is turned on, the RF receives signal then feeds into two paths, Rx_1800_RF and Rx_900_RF.

This Rx_1800_RF path contains one SAW filter U46 to filter any unwanted signal apart from the DCS Rx band. And the U45 in the Rx_900_RF path is to filter out unwanted signal beyond the GSM Rx band. These two paths are then connected to the DLNAI (# 2) and GLNAI(# 4) of W3020(U31) respectively.

The RF receive signal is amplified by LNAs in W3020 with the output at DLNAO (# 63) and GLNAO (# 61) respectively, and then pass through the SAW filters B4635 (U22) and B4684 (U10). After this filtering process, the signal then feeds into U31 for mixing with LO, which is produced by the synthesiser W3000 (U19), and two VCOs.

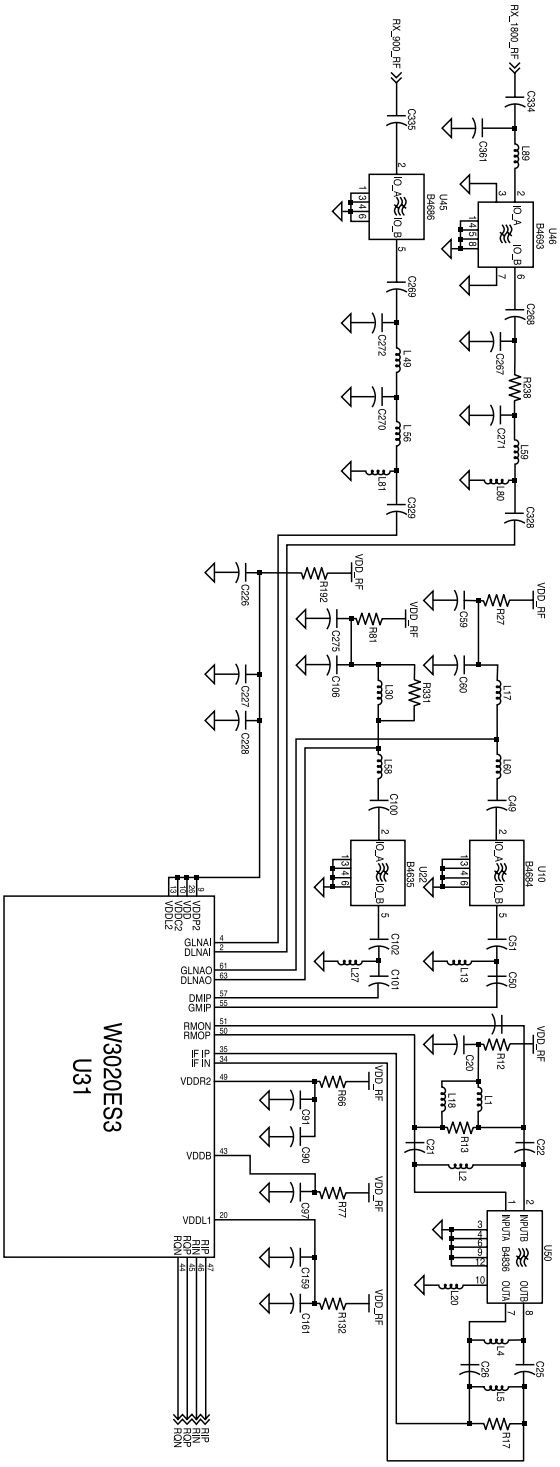
In W3020, UHF mixers produce a IF signal of frequency 270 MHz at RMON (# 51) and RMOP (# 50) in differential mode. This differential signal is filtered by B4836 (U50), a 270 MHz SAW filter, and then fed to W3020 #34 and #35.



2. RX I&Q Demodulator

The modulated IF signal is demodulated by mixing with a 270 MHz signal, which was derived from the 540Mhz oscillator. Before the mixer is a 32db gain IF amplifier which can be set to either 0 or 32db of gain. The mixer has 6db gain itself, and then followed by two low-pass filters and five baseband amplifiers.

The W3020 produces demodulated baseband signals at RIP (# 47), RIN (# 46), RQP(# 45) and RQN(# 44) which are connected to SC1688(U1) .



3. UHF Synthesizer (Rx)

The synthesizer for RX and TX UHF are implemented by W3000 (U19). The outputs of DCS VCO (1530 ~ 1610 MHz) and GSM VCO (1160 ~ 1230 MHz) are fed to U19 #5 for phase comparison in order to generate the charge pump output U19 #2 to control the frequency of VCOs. On the locked state, the frequency of VCO is

Fvco=[(P*M)+A] * fref / R

Where

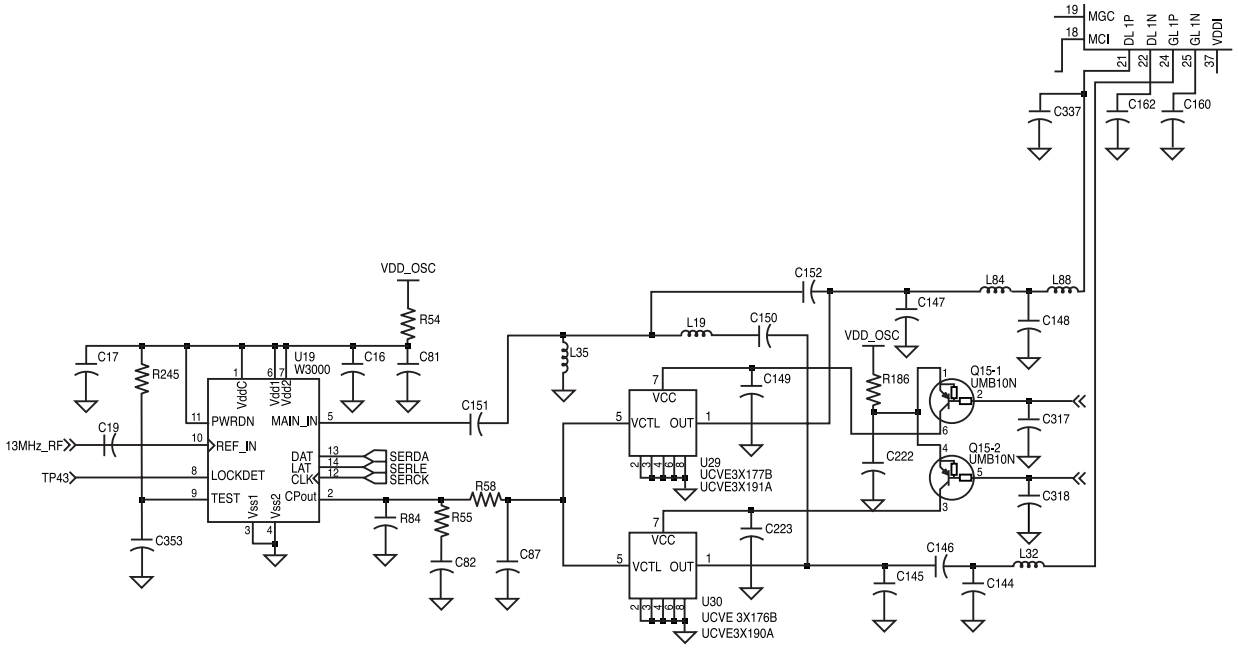
Fref is the frequency of the signal on U19 #10. Here is 13 MHz.

P, M, A, R are all constants set by the three-wired digital control bus:

DATA #13
LATCH #14
CLOCK #12

The loop filter between U19 #2 and VCO #5 converts the current signal on U19 #2 to the voltage signal on VCO #5.

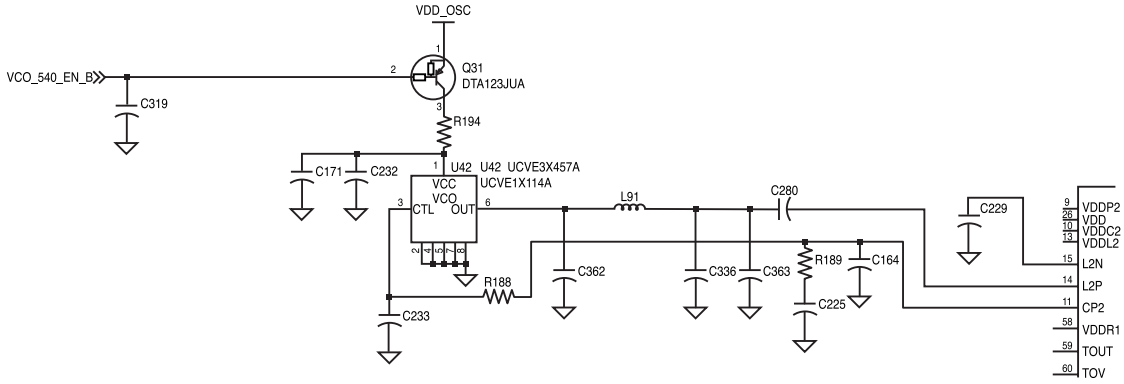
Q15 is a switch, which controls the power supply of VCOs.



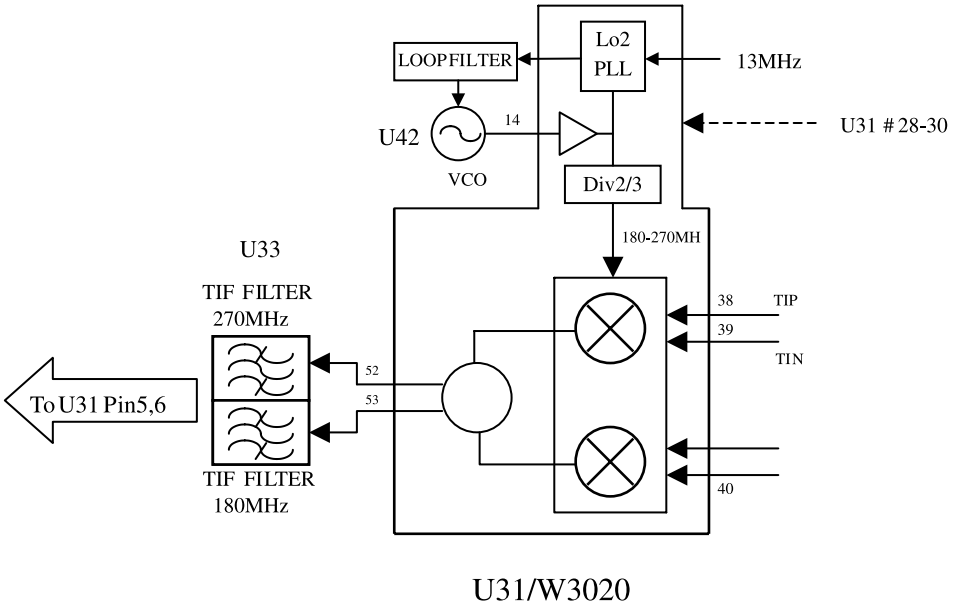
4. The Rx IF Synthesiser

The major part of Rx IF synthesiser is built in W3020 including a phase comparator, and a charge pump, etc. Outside the W3020, the C164 and R189 and C225 form the loop filter; Q31 is a power switch and the VCO would be locked at 540 MHz.

In the W3020, this 540 MHz signal is divided by 2 for the receiver, divided by 2 for the GSM Tx and divided by 3 for the DCS Tx.



2-2. Transmitter



[The TX IF Modulator in W3020]

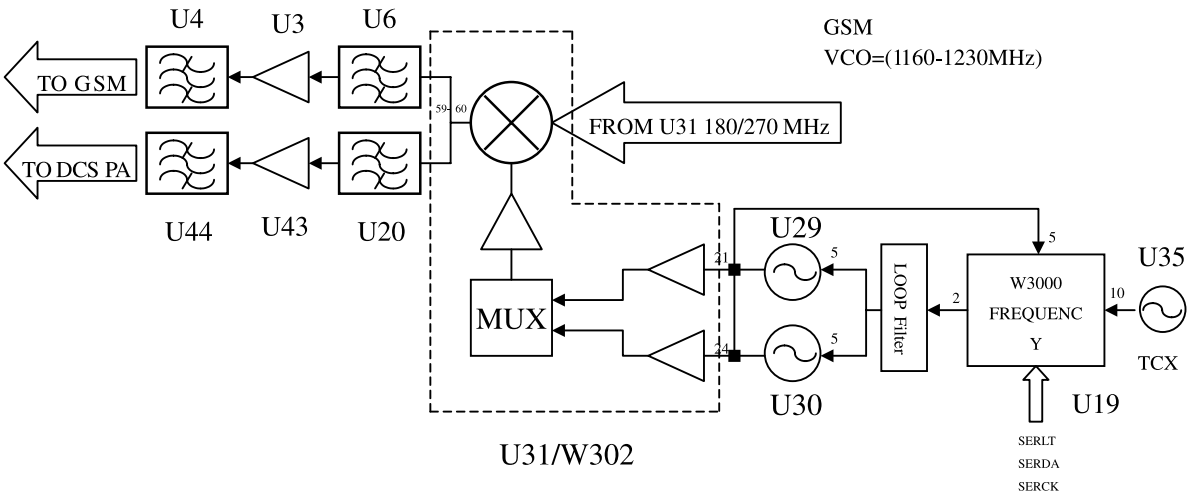
1. The TX IF Modulator

The TX I & Q signals from U1 #86-89 are fed to #38-41 of the W3020 TX modulator (U31), where they are then modulated onto either a TX IF of 270Mhz (for GSM-TX) or 180Mhz (for DCS-TX) by the quadrature-mixer inside U31.

The signal TX LO IF (180-270Mhz) is input from U31. This signal is produced by the external 540Mhz oscillator (U42), which has been divided down by a factor of 2 for GSM-TX or 3 for DCS-TX. This division factor is set by the control signal of U31 #28-30. The TX modulated IF signal of 180/270Mhz is output on #52-53 of U31 for GSM/DCS.

2. The TX IF Synthesizer

The second local oscillator (LO2), comprising a buffer for the external voltage-controlled oscillator (VCO) and a phase-locked loop (PLL), feeds the IF portions of both the modulator and the receiver. An external reference source, voltage-controlled crystal oscillator (VCXO), is divided from 13 MHz to 1 MHz through a counter. The 1 MHz is called the comparison frequency. The VCO(U42) frequency of 540 MHz is also divided down to 1 MHz. Both signals are fed into a phase detector, and the resultant error signal is fed through an external low-pass filter to the control input of the VCO (U42).



[The UHF Mixer/Amplifier/TX UHF Synthesiser]

3. The UHF Mixer Amplifier

The modulated TX IF signal GSM (270Mhz) or DCS(180Mhz) is mixed onto the GSM(890Mhz-915Mhz) or DCS(1710Mhz-1785Mhz) TX RF frequency. This is achieved by mixing the TX IF signal with the TX UHF VCO output from U30 for GSM and U29 for DCS. Hence:

GSM TX = UHF VCO - 270 ie, (1160 - 270 = 890Mhz)

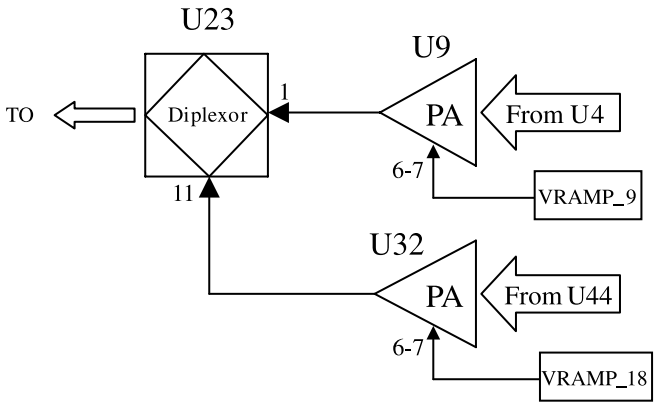
DCS TX = UHF VCO +180 ie, (1530 + 180 = 1710 Mhz)

The modulated RF signal is then output on #59-60 to a BPF and then enters the UPC2771TB (U3/U43) at #1. The RF modulated signal is then amplified by the Pre-driver with the UPC2771TB IC.

The RF signal is then output on #4 of the UPC2771TB and passed through another stage of filtering (BPF: U4/U44).

4. The TX UHF Synthesizer

In TX mode the TX UHF VCO output is fed to #5 (U19) and then pre-scaled down to 200khz. The phase comparator within U19 compares this signal with a 200khz signal derived from the 13Mhz clock (U35) and outputs a current phase difference at #2. A loop filter then converts this signal into a voltage phase difference and feeds it to #5 (U29) or (U30). The voltage phase difference determines the UHF VCO frequency i.e. GSM TX 1160Mhz -1185Mhz, DCS TX 1530Mhz - 1610Mhz. Three control inputs are used in the UHF Synthesiser SERDA, SERCK, SERLT. It is the SERDA control input, which initially sets the TX VCO frequency. This is totally dependent on the chosen traffic channel the logic circuit has selected at the time.



[The Power Amp Circuit]

5. The PA Circuit

The power amplifier control circuit ensures that the RF signal is regulated to the required limits of operation. The TX RF signal is input on #3(U9) or (U32) and the power amplifier outputs the signal at #10. The diplexor is tuned to the GSM or PCN duplex spacing so enabling selectivity between GSM and PCN Rx or Tx.

2-3. The PA Circuit and its Control

1. The PA Circuit and its Control

The power amplifier control circuit ensures that the RF signal is regulated to the required limits of operation.

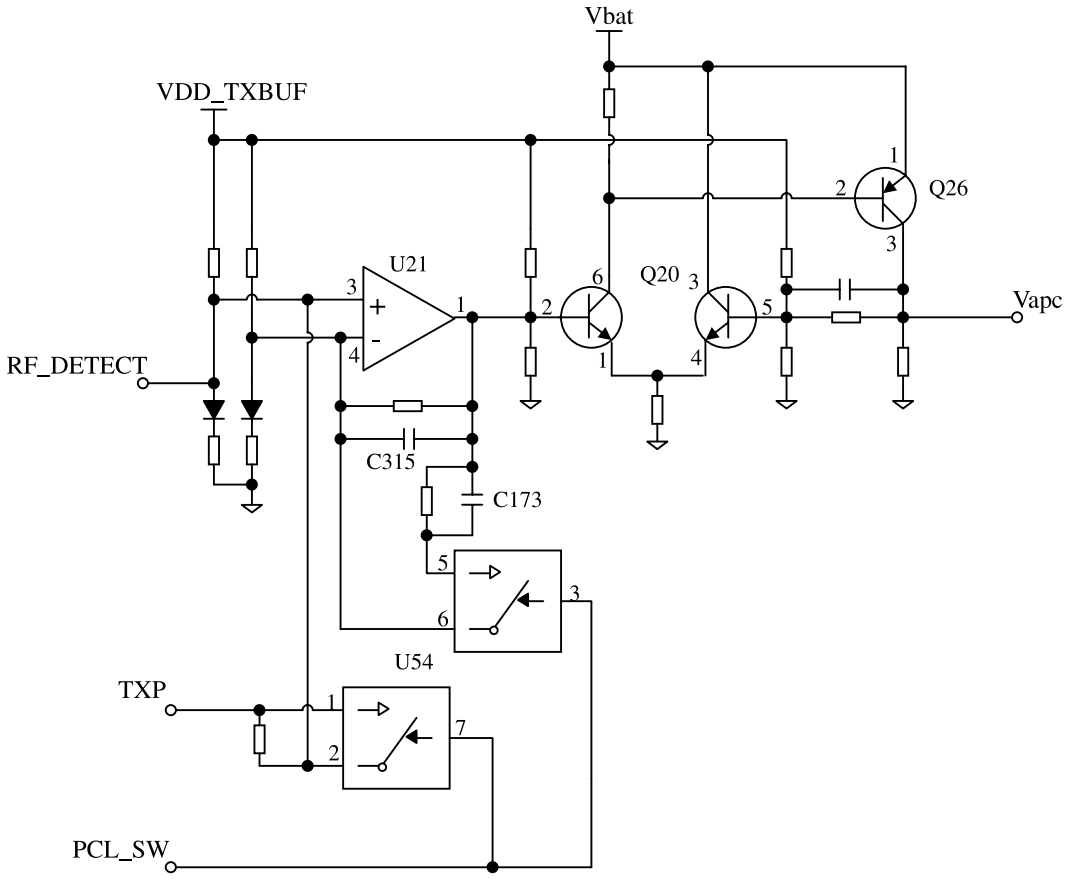
Power-control is carried out according to the measurement of the power-output of the P.A. (RF_Detect, see Fig.: P.A Circuit Control). A voltage drop, which is converted from the RF power through a Diode-Detector, is then integrated by the operational amplifier (U21) to give an error voltage regulates the TXP signal.

The TXP input signal to the power control circuit is generated by the U1 #90. TXP provides a limit for the frequency spectrum caused by burst modulation.

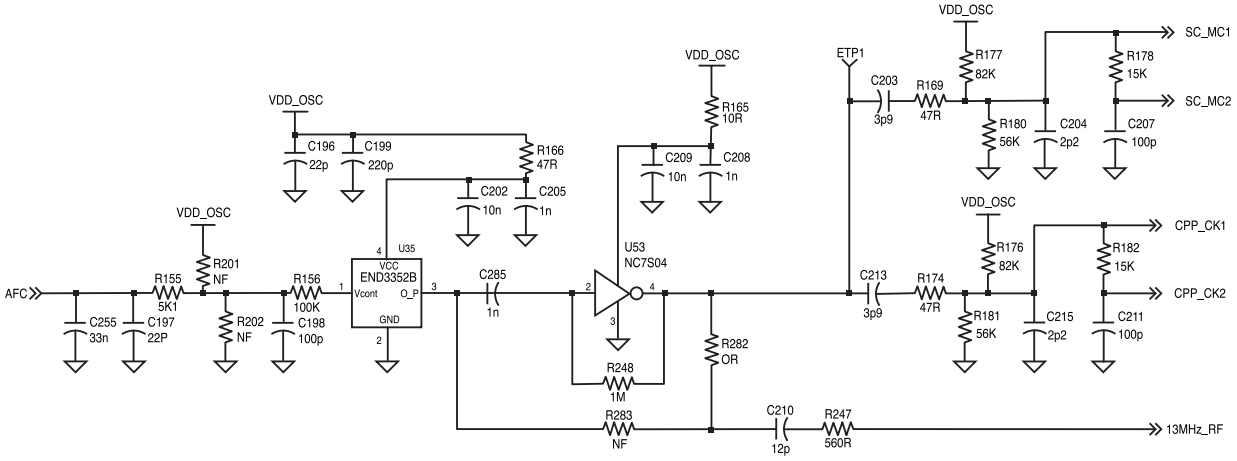
VDD_TXBUF (2.85V) is the main power supply for power control circuit. An op-amp, U21, which outputs a control signal, but is not enough to drive the P.A. to the maximum output. Q20 and Q26 are an extra amplifier and buffer stage that use Vbat (more than 3.5V) in order to drive the control signal to a sufficient level for P.A.

The power control circuitry has two different loop gains for increasing the dynamic power control range and it is switched by U54 that is controlled by the control supply, PCL_SW.

The control supplies, PA_900_EN_B and PA_1800_EN_B control the switches Q28 and Q29 to make sure the control signal goes to the right PA, VRAMP_900 and VRAMP_1800.



2-4. 13 MHz Clock



The 13 MHz-clock (END3352B) consists of a TCXO (Temperature Compensated Crystal Oscillator) which oscillates at a frequency of 13MHz.

It's used within the W3000 Synthesizers, Communication Protocol processor (CPP), and Super Chip 1 (SC1689).

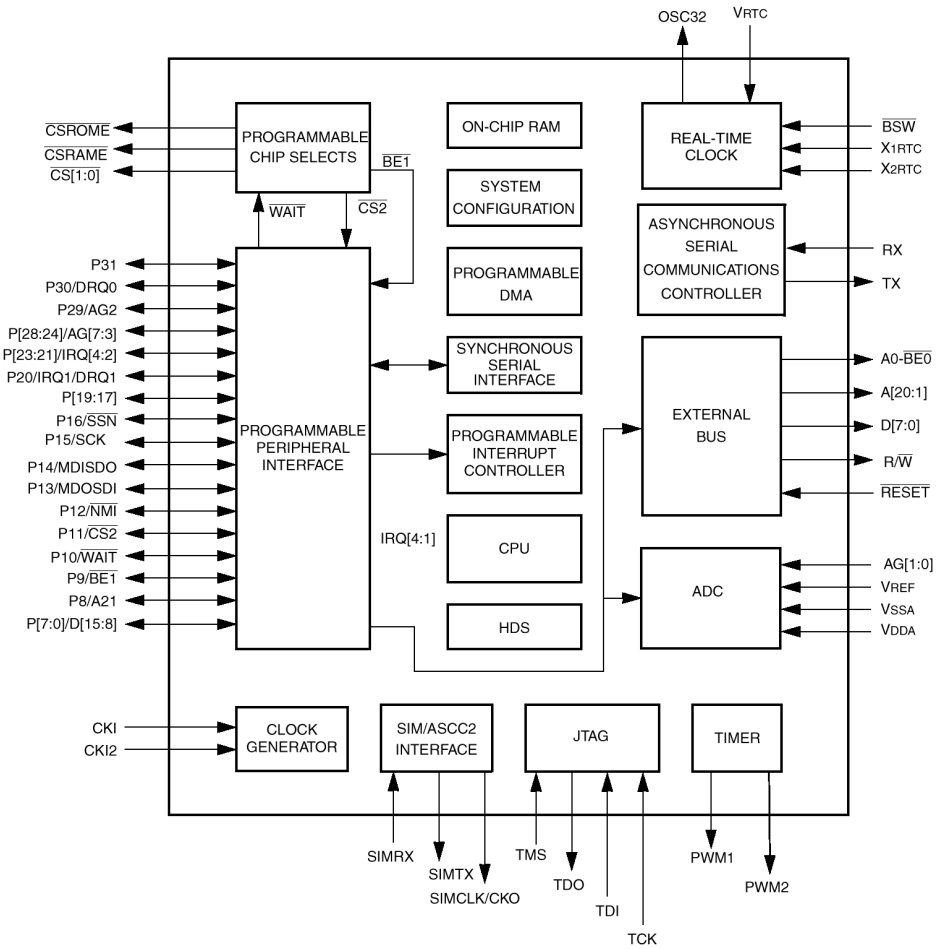
NC7S04 buffer the output to CPP, SC1 and W3000.

2-5. Main Processor and DSP

1. Main Processor CPP-C

The CPP-C is a Lucent Technologies designed processor. The CPP-C performs the following functions:

- CPU
- CPU Interface
- Interrupt Controller
- Baseband Power Control
- Keypad Control
- Display Interface
- Buzzer Control
- UART Control/Interface
- I/O System Connector Interface
- Battery Voltage Monitoring
- Charge Control
- Real Time Clock
- CPU Timers
- Backlight Control
- Vibrator Control



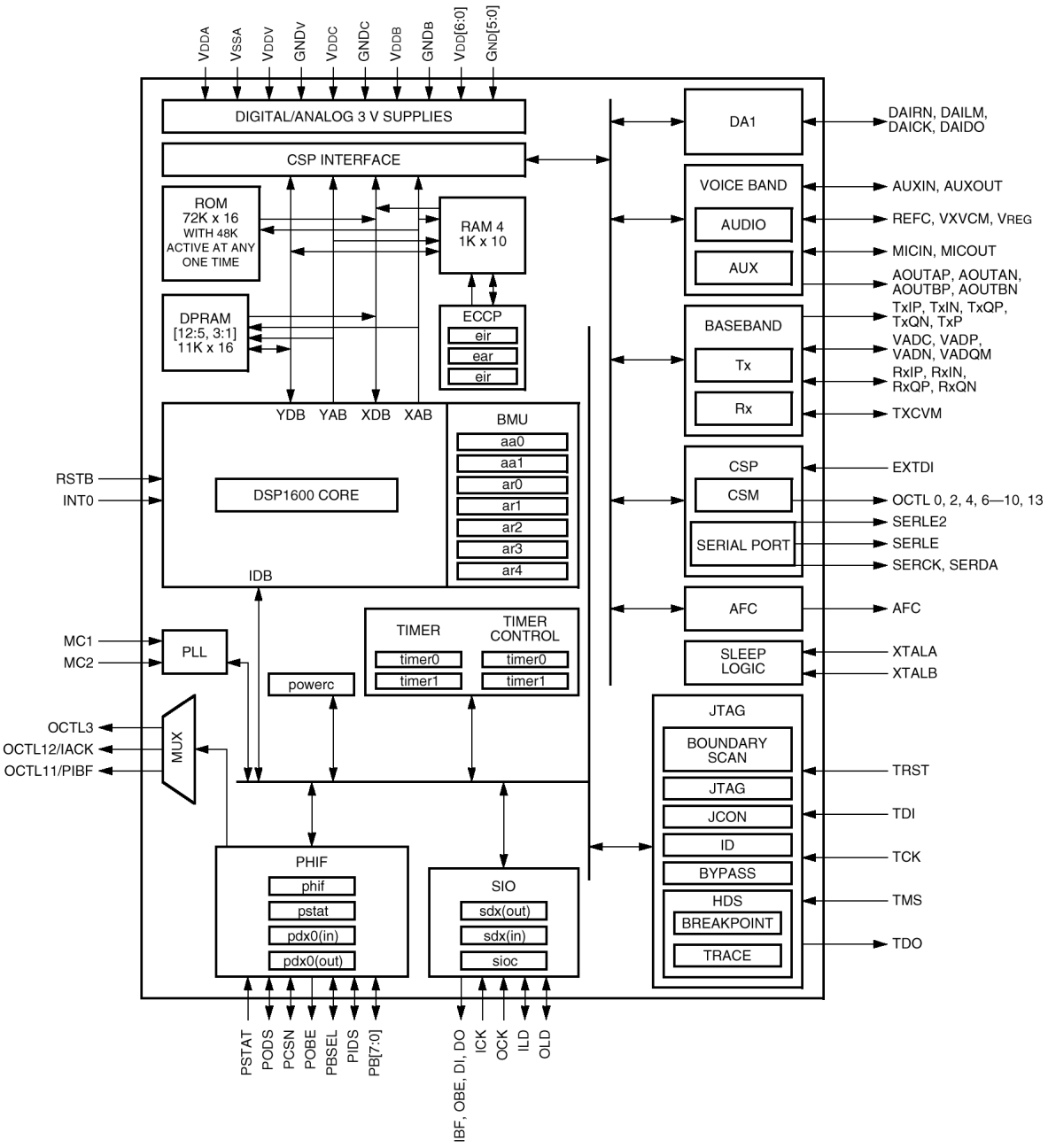
[System Block Diagram of CPP-C]

2. DSP and Mixed Signal Processor SC1689

Designed specifically for GSM cellular systems, the SC1689 (Super Chip 1) processor of Lucent Technologies is a mixed-signal device that is based on the DSP1600 core with a bit manipulation unit (BMU), error correction processor (ECCP), and conversion signal processor (CSP) core.

The CSP consists of a baseband, voice band, and digital audio interface to fulfill the GSM requirement for a voice band and baseband interface.

The device peripheral combination consists of a serial port, parallel host interface, and two timers. The device (IROM0 and IROM1) switchable via ROMMUX in the **ioc** register.



[System Block Diagram of SC1689]

3. CPU Memories

Flash ROM

An 8Mbit programmable ROM is capable of being written while being still in circuit. Contains all the main command software for the mobile.

SRAM

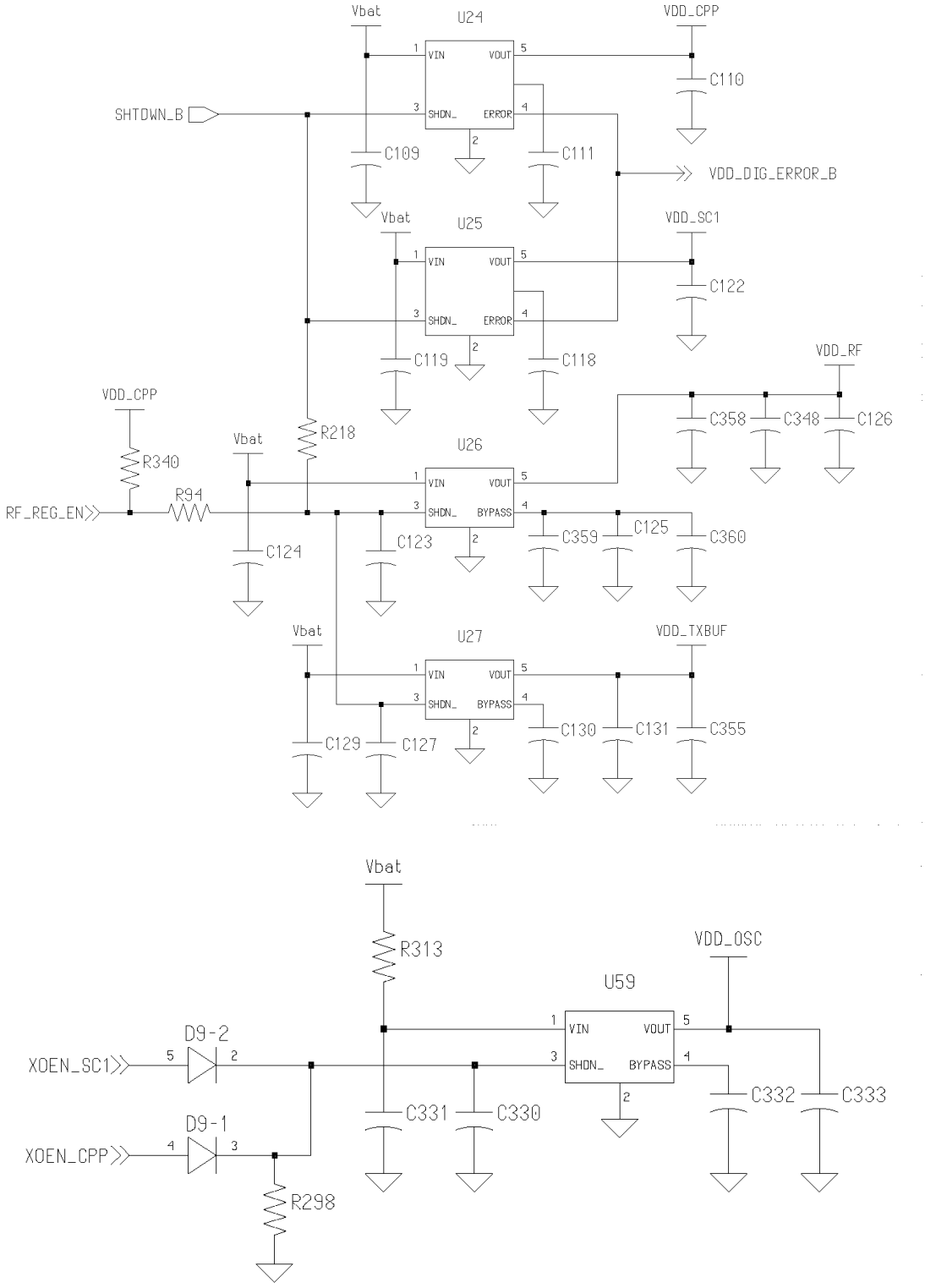
A 128Kbit by 8 temporary memory device, which is used by CPP-C for CPU execution.

2-6. Power Supplies and Control Signals

There are five regulators used in the phone: U24, U25, U26, U27 and U59. Those regulators are dedicated power supplies, which provides most of the power requirements for the logic and RF circuits. Each of these regulators can be controlled by individual enable signals. These are configured as the following figure and table.

Regulator	Voltage	Powers	Enable Signal
Regulator 1 U24 VDD-CPP	2.85V ± 0.5	CPP-2 digital circuitry, LCD	SHTDMN-B
Regulator 2 U25 VDD-SC1	2.85 ± 0.5	SC1 digital circuitry	SHTDMN-B
Regulator 3 U26 VDD-RF	2.85 ± 0.5	RF circuitry	RF-REG-EN
Regulator 4 U27 VDD-TXBUF	2.85 ± 1.5	Transmit power control	RF-REG-EN
Regulator 5 U59 VDD-OSC	2.9 ± 0.04V	VCO	XOEN-SC1 OR XOEN-CPP

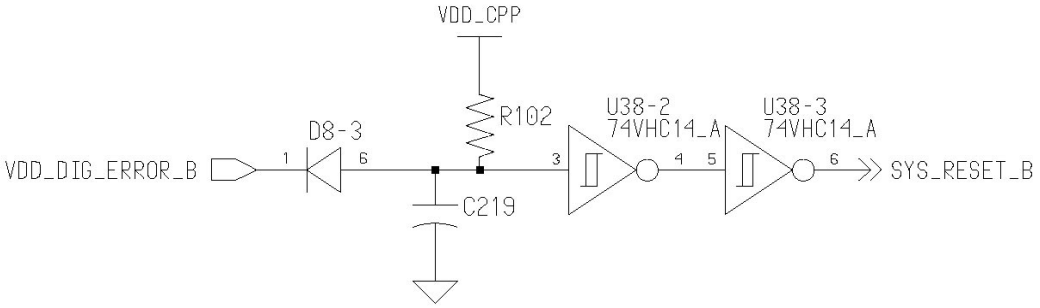
[Table - Power Supply]



[Power supply]

1. System Reset

The R.C reset circuit generates a reset signal (active low) to the CPP-2 (SYS-RESET-B #77). when it detects that the VDD-DIG-ERROR-B active (Regulator 1,2 voltage is below the threshold of 2.85V-0.5%) The device also reset CPP-2, this then holds the CPP-2 in reset mode, allowing only the real time clock to run.

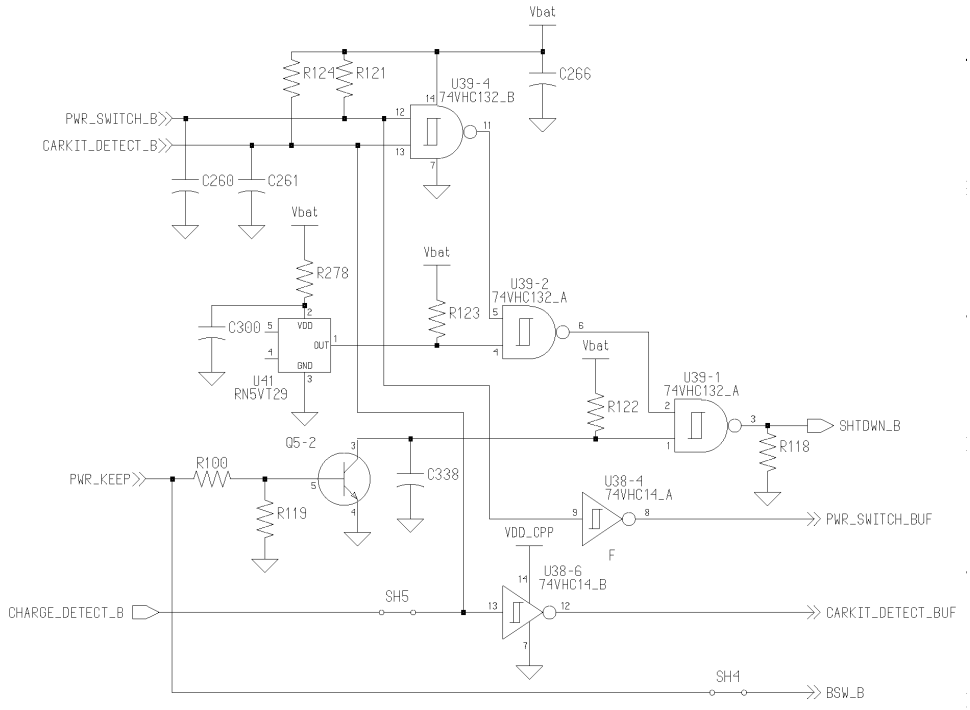


[Reset Circuit]

2. Power On/Off

Power switch is formed by U39, Q5-2. The phone can be switched on either by pressing the power key or connect to charger/ carkit, where PWR_SWITCH_B or CARKIT_DECTECT_B is pulled to low and SHTDN_B, which controls the on/off of regulators, becomes high. The whole power system is thus turned on. If either one of those two signal is kept low for one second, the PWR_KEEP signal will be asserted to high by CPP. This realize "soft on" power key.

During switching off, if power key has been pressed more than one second then PWR_KEEP will be released by CPP. This shuts down the power system.

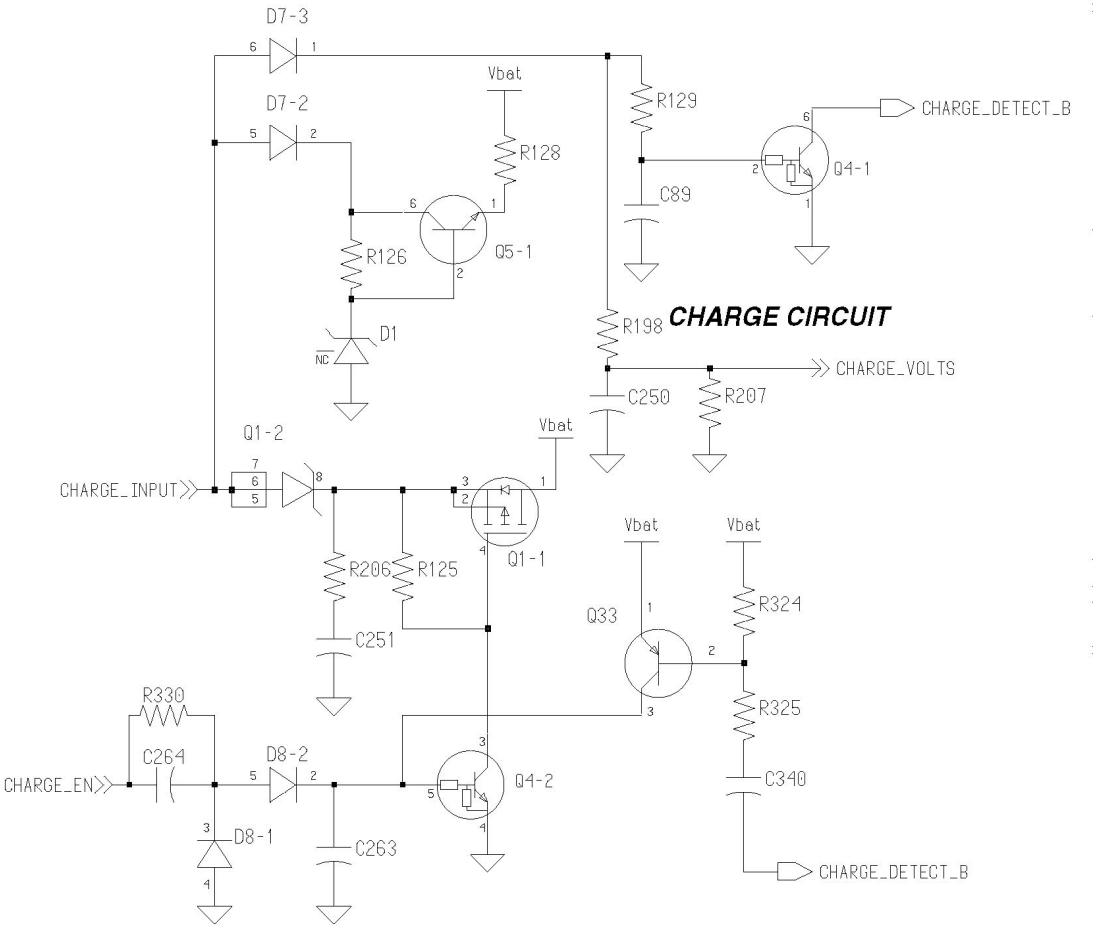


[Power On/Off Control Circuit]

3. Battery Charge Control

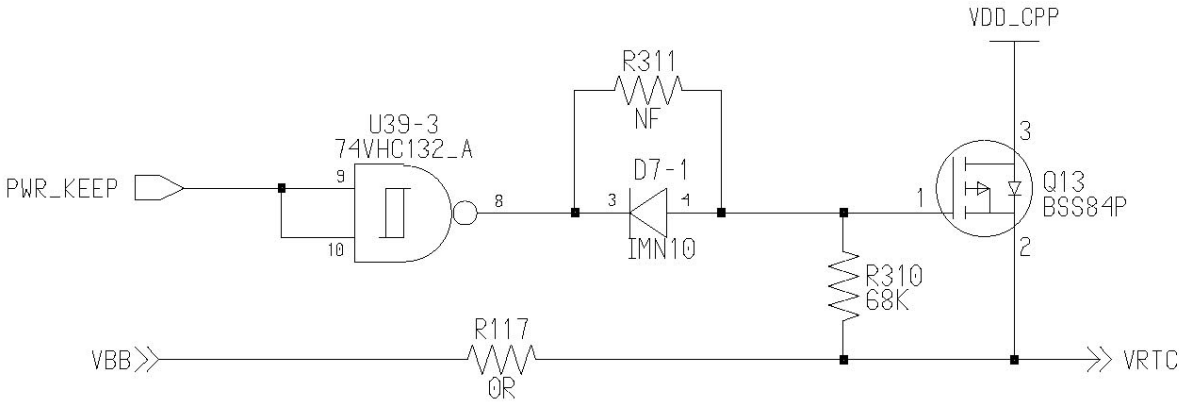
Charge control is composed of Q1, D1 D8-1, D8-2, Q4-2, Q5-1 and Q33. Charge control software controls the on/off of CHARGE-EN, which allows charge current to go through Q1-1 to battery cell. As the battery is fully charged, CHARGE-EN becomes low to stop fast charging.

When the phone is off and the charger is plugged in, D7-3, Q4-1, and U38-6 form an auto-power-on circuit to turn on the phone..



[Battery Charge Control Circuit]

4. Real-Time Clock



The real-time clock is driven by a 32.768 kHz clock from a crystal oscillator. The input clock is divided by 32,768 to generate a clock with a 1 second period that increase a 29-bit seconds counter. In addition, it can generate interrupts at a programmed time. The following are the features of RTC:

- 17-year time interval with 1-second resolution.
- Interruption of programmed time alarm

The real-time clock consists of a seconds counter. The input clock frequency to the RTC must be 32.768 kHz. The seconds counter is updated using a clock generated by dividing the external input clock to the RTC by 32,768.

The real-time clock assumes an interrupted power supply VRTC. The $\overline{BSW}$ signal is used by CPP to force internal inputs to the real-time clock to appropriate levels in order to ensure correct functionality and reduce power dissipation. When $\overline{BSW}$ =1,VRTC is connected to primary power, V_{DD}. When $\overline{BSW}$ =0, VRTC is supplied by backup power. The real-time clock function is specially designed to handle the situation where V_{DD} to the CPP is between 0 V and 2.7 V. It's the responsibility of the external logic to the select either the normal power supply or a backup battery to provide uninterrupted VRTC. Switching to backup power has to be done in the following sequence:

The $\overline{BSW}$ should be asserted.

Switch VRTC to backup power.

Turn off V_{DD} and maintain VRTC.

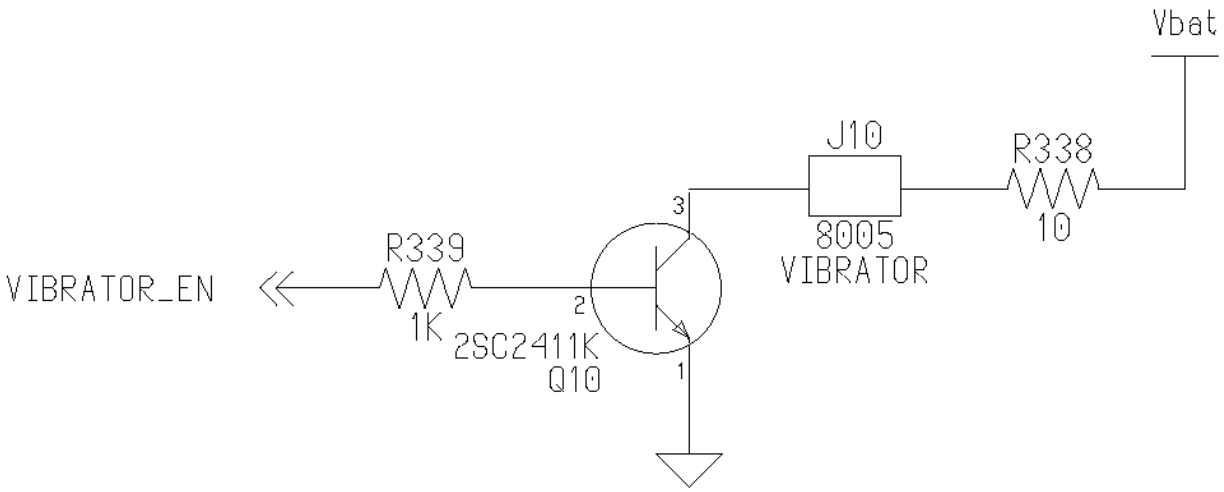
Switching back to primary power has to be done in the following sequence:

Turn on V_{DD}.

Switch VRTC back to primary power.

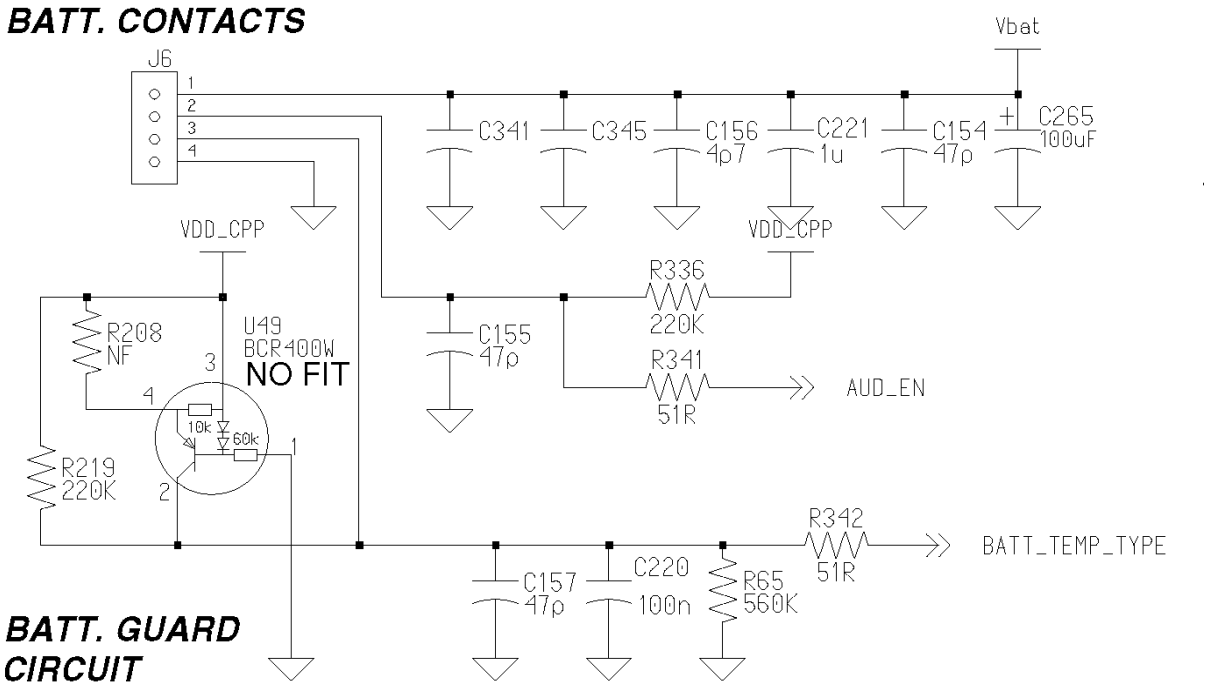
The $\overline{BSW}$ signal is deserted.

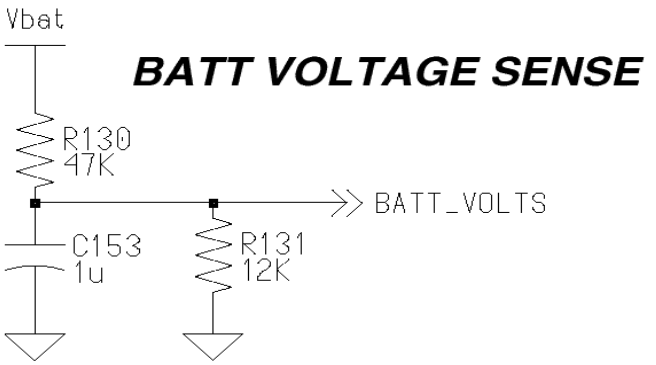
5. Vibrator



The vibrator is driven by the signal VIBRATOR_EN, which is output from U58 (74VHC273). The signal is amplified by the transistor Q10 (2SC2411K) and is supplied from Vbat.

6. Battery Voltage and Temperature Sensing





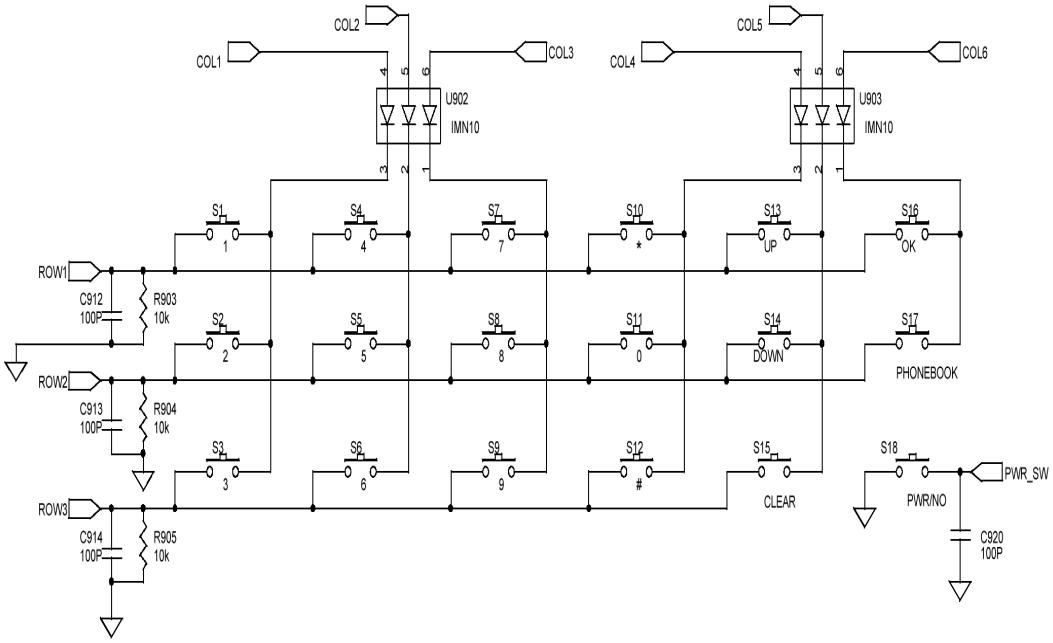
The CPP can monitor the state of the battery through the battery interface connector J6. This can be done during both normal and charging operations. The battery provides a number of interface connections that enable the CPP determine the battery type, its capacity, temperature and whether it is possible to re-charge the cell(s). The thermister in the battery pack which is attached to the battery connector (pin3) is used to produce an analogue reading of the board's own surface temperature. The J6 connector provides a connection between the battery power contacts Vbat/GND to the main board and BATT_TEMP_TYPE monitoring circuits to the battery.

BATT_VOLTS enables the CPP (pin59) to measure the battery voltage and hence determine how much charge remains in the cells.

The battery pack includes an internal thermister, which is used to produce the analogue signal BATT_TEMP_TYPE. This enables the CPP and external charger to determine the battery type and battery temperature, which is used to protect the battery from overheating while charging.

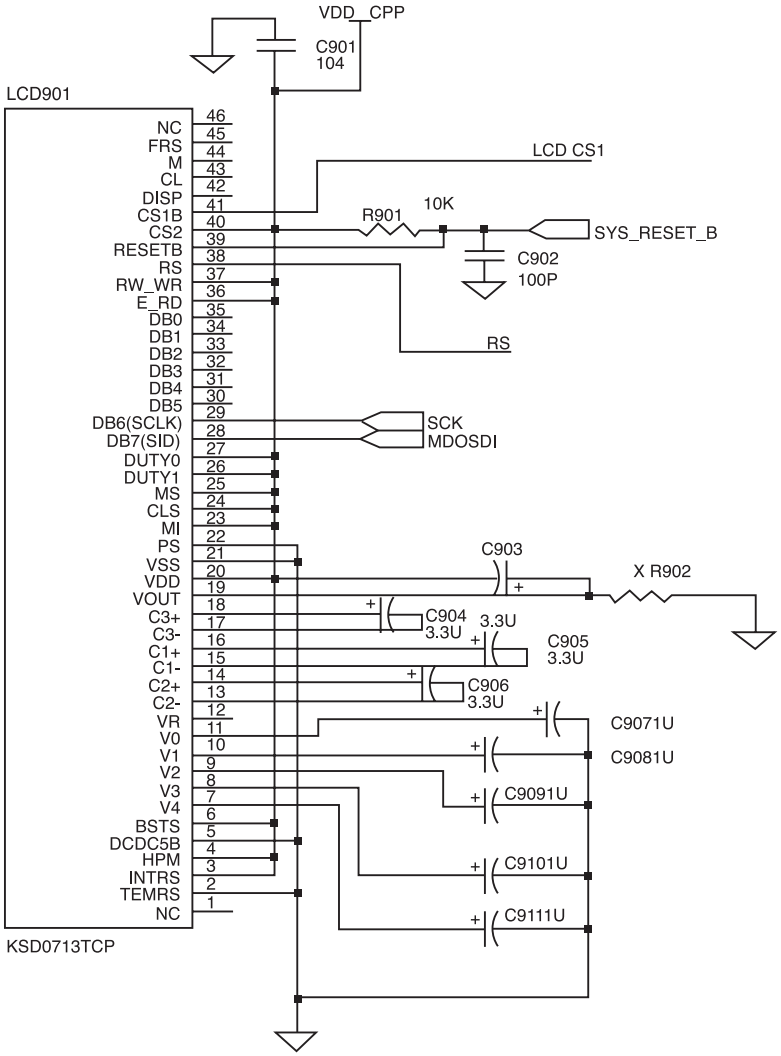
2-7. User Interface Board

1. Keypad Switches and Scanning



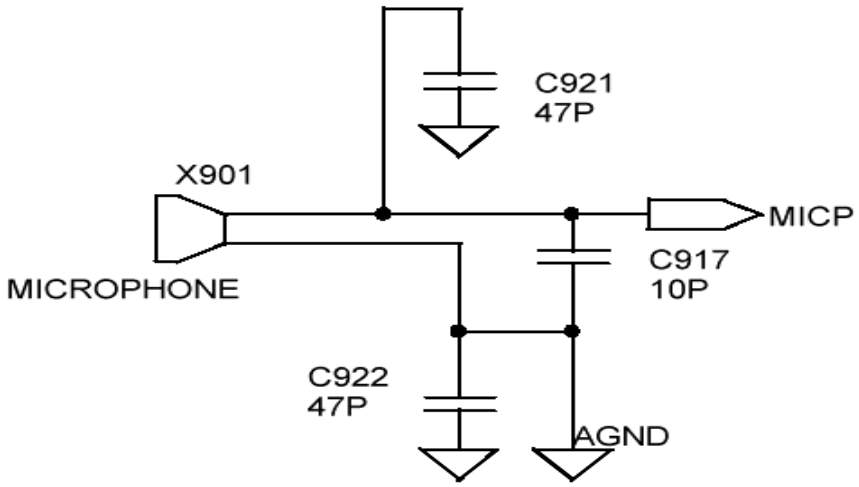
The key switches are metal domes, which make contact between two concentric pads on the top layer of the PCB when pressed. There are 18 switches (S1-18), connected in a matrix of 3 rows by 6 columns, as the figure shown above except for the power switch (S18), which is connected independently. Functions, the row and column lines of the keypad are connected to ports of CPP. The rows are outputs with 10k ohms pull-down resistors, while the columns are inputs. When a key is pressed, the corresponding row and column are connected together, causing the row output to go high and generate an interrupt. The columns/rows are then scanned by CPP to identify the pressed key.

2. Display and Interface



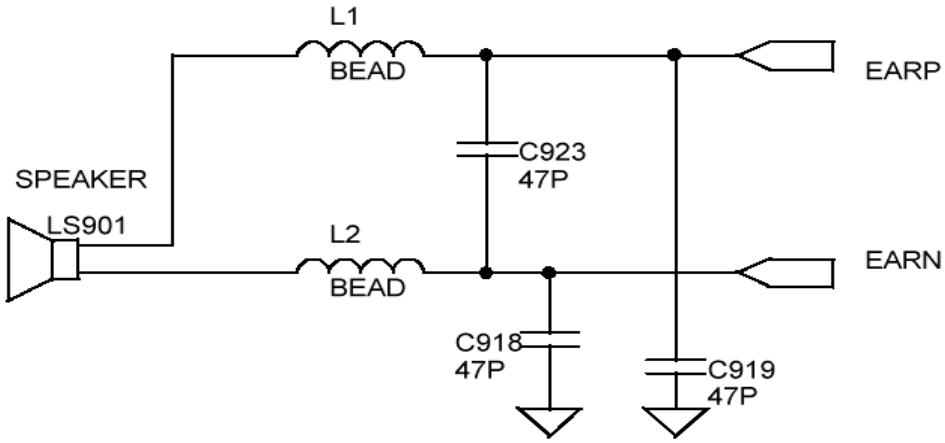
Power to the LCD is controlled by CPP and can be switched on and off via SYS_RESET_B. A high on this output powers the LCD; a low switches it off. There is also the control output LCD_CS1 that is also derived from CPP, this acts as the chip select enable for the LCD module. CPP uses MDOSDI pin to send serial data for displaying graphical text onto the LCD

3. Microphone



The microphone is mounted in the handset front cover and connects to User Interface Board. The audio signal is passed to User Interface Board and to the MICIN (#4) pin of SC1689. The voltage supply VREG is output from SC1689 #3, and is a bias voltage for both the MICP (through R8) and EXT_IN lines. The microphone or EXT_IN signal is then A/D converted by the CSP part of Super-chip SC1689. The digitized speech is then passed to the DSP section of SC1689 for processing (coding, interleaving etc.).

4. Earpiece



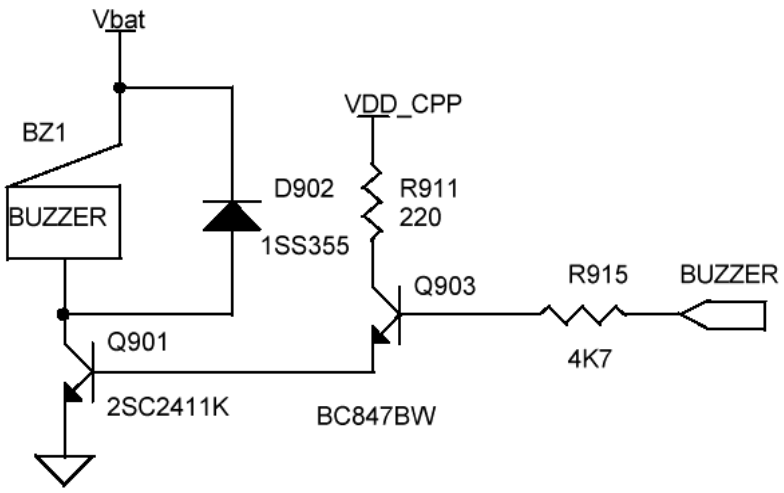
The earpiece is driven directly from SC1689 AOUTAP (#94) and AOUTAN(#93) pins and the gain is controlled by the DSP software. The earpiece is located in the handset front panel, and the signals are routed to it via two connection pads between User Interface Board and earpiece .

5. Hands-free Interface

The audio out (AOUTBP & AOUTBN) to the hands-free kit consists of a pair of differential signals from SC1689 auxiliary outputs (#95-96), which are tracked down the board to carkit connector (J5) at the base of the handset.

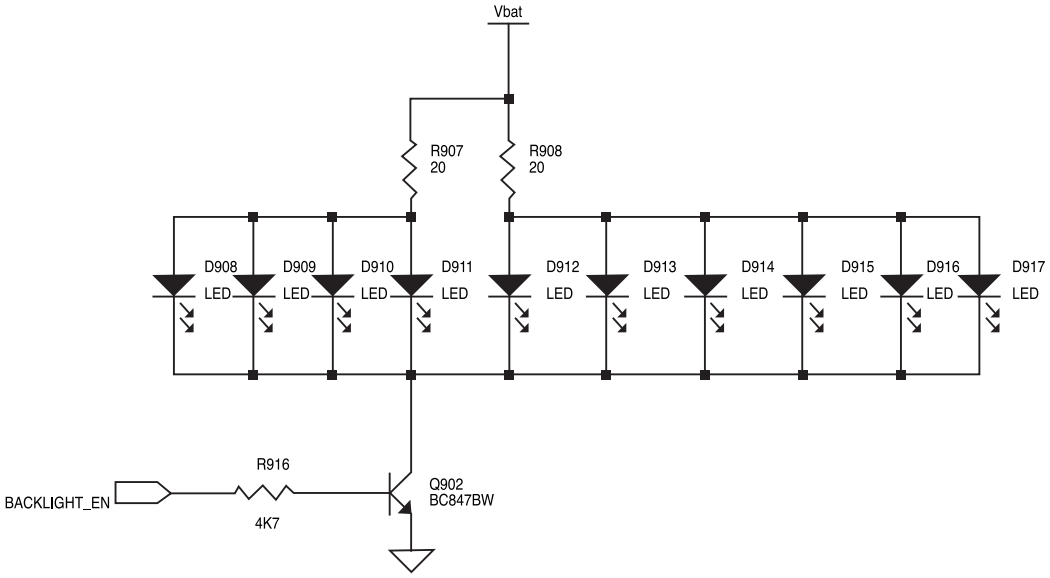
The audio in (AUXIN) from the hands-free is converted to a single signal using the op-amp. The bias voltage VREF from SC1689 #3 is used as a reference voltage for this amplifier. The DC level of the signal is supplied to the AUXOUT pin. And the EXT_IN signal is then input to the AUXIN (#99) of SC1689.

6. Buzzer Driver



The buzzer is a piezo-electric transducer, which is driven by a pulse-width- square wave from the PWM1 output of CPP. Q901 and Q903 amplify the signal in order to achieve the specified loudness.

7. Back-light Illumination



In Back-light illumination, there are 10 green LEDs (six for keys and four for the LCD) in User interface Board, which are driven by BACKLIGHT_EN line from CPP.

2-8. Testing Set-up and Checking Signals

1. Receiver RF Levels and Checks

This section shows the typical RF levels expected throughout the receiver path. A block diagram showing the locations of the RF measurement points and levels is shown in Figure1.

2. Receiver Testing Set-up

To check the receiver the following conditions have to be set:

1. On a signal generator or a GSM/DCS test box, output a CW signal of amplitude = -40dBm at either: 947.4MHz (CH62) when testing the GSM Rx path or 1842.6MHz (CH699) when testing the DCS Rx path.
2. Set the DC power supply to 3.8volts.

Note : All RF values shown are only intended as a guide figure and may differ from readings taken with other test equipment and leads. Lead and connector losses should always be taken into account when performing such RF measurements.

3. Testing Receiver

Using a suitable high frequency probe measure the RF levels at the relevant points shown in Figure1 and compare your measurements with those shown in the diagram. If there are any major differences between the readings taken and those indicated then further investigation of that particular point will be required. It will also be necessary to ensure that all the following power supplies and signals are present which control this part of the receiver circuit:

1. The Control Signal of Diplexer (see Figure 6)
2. VDD_CPP (see Figure 7)
3. VDD_SC1 (see Figure 8)
4. VDD_OCS (see Figure 9)
5. VDD_RF (see Figure 11)
6. TCXO (System Clock, see Figure 15)

4. Transmitter RF Levels and Checks

This section shows the typical RF levels expected throughout the transmitter path. A block diagram showing the locations of the RF measurement points is shown in Figure 2.

5. Transmitter Testing Set-up

To check the transmitter the following conditions have to be set:

1. Set the DC power supply to 3.8 volts.
2. Power up the GSM/DCS test set and then establishing a call with an attached mobile on active mode.
3. Select Channel, Tx Level and Input Level according to which parameter is required.

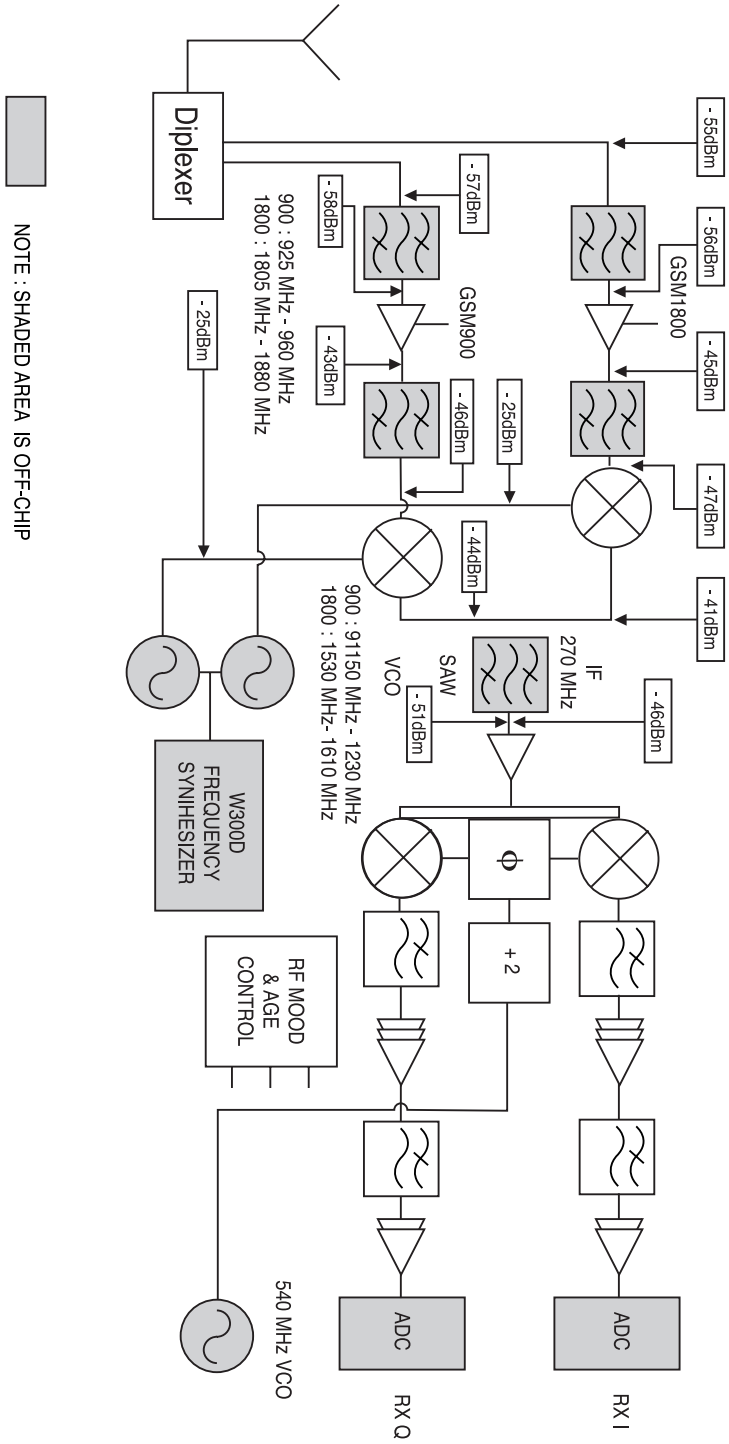
6. Testing the Transmitter

Using a suitable high frequency probe measure the RF levels at the relevant points shown in Figure 2 and compare your measurements with those shown in the diagram. If there are any major differences between the readings taken and those indicated then further investigation of that particular point will be required. It will also be necessary to ensure that all the following power supplies and signals are present which control this part of the transmitter circuit:

1. The Control Signal of Diplexer (see Figure 6)
2. VDD_SC1 (see Figure 8)
3. VDD_OCS (see Figure 10)
4. VDD_RF (see Figure 12)
5. VDD_Tx_BUF (see Figure 14)
6. TCXO (System Clock, see Figure 15)

■ Receiver RF Levels

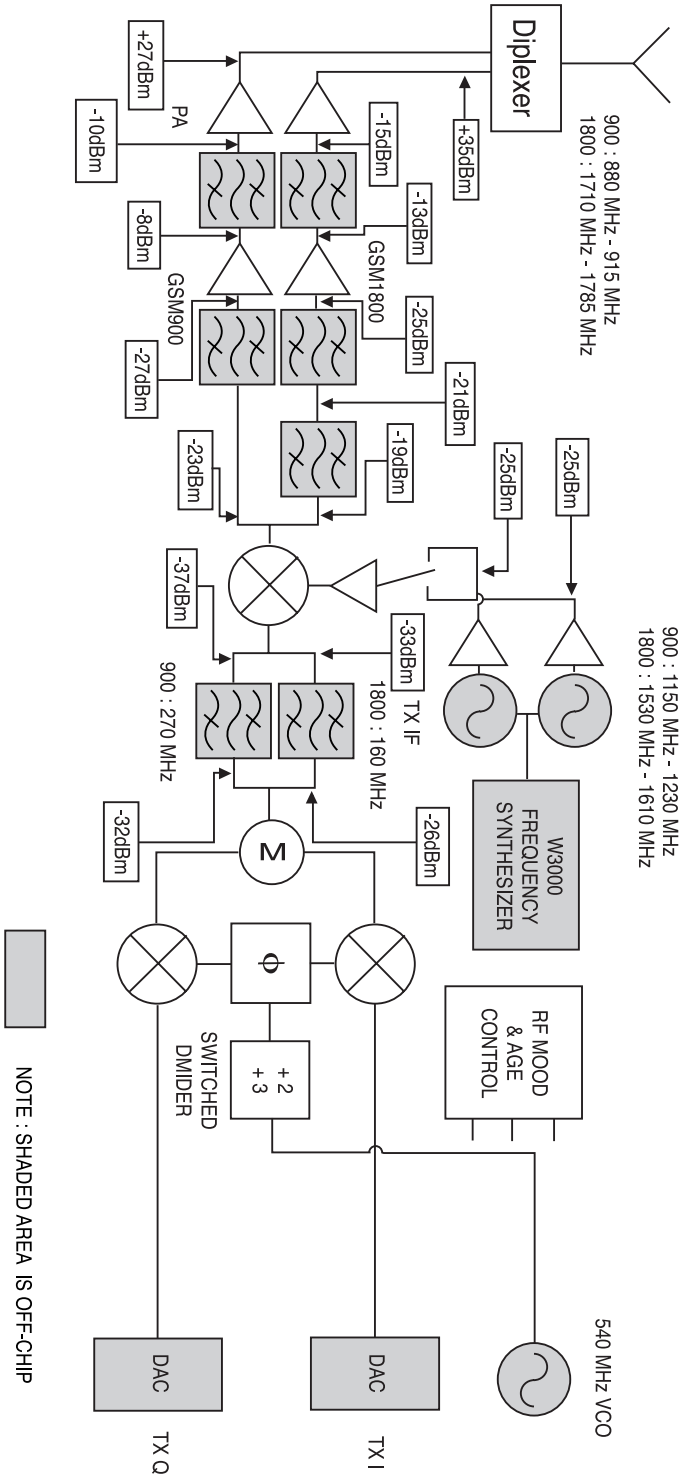
- **DCS: Ch.699, -40dBm**
- **GSM: Ch.62, -40dBm**



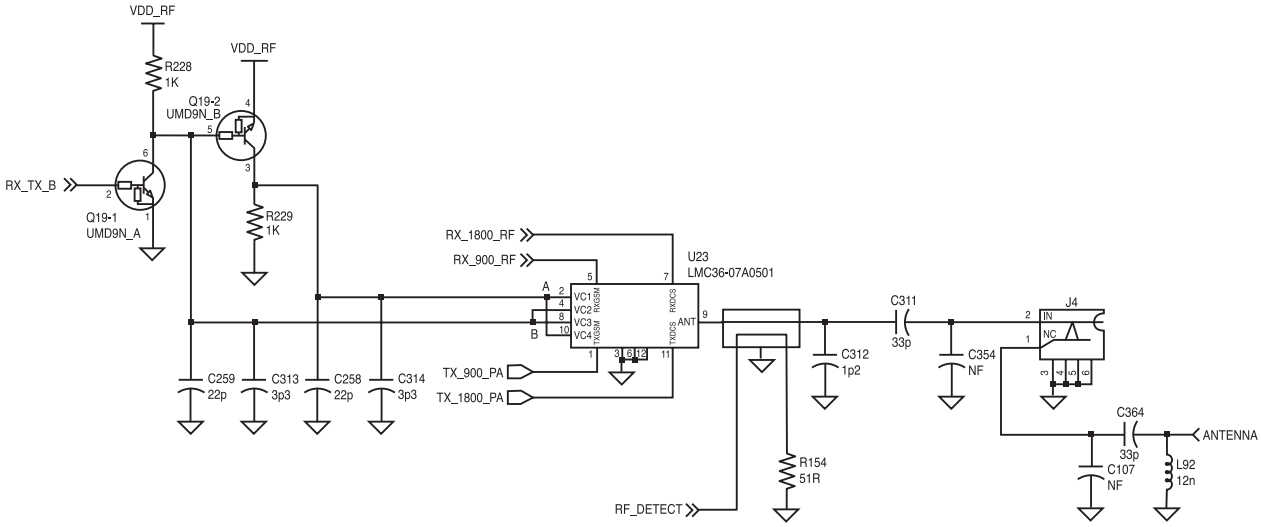
[Figure 1. Receiver Block Diagram]

■ Transmitter RF Levels

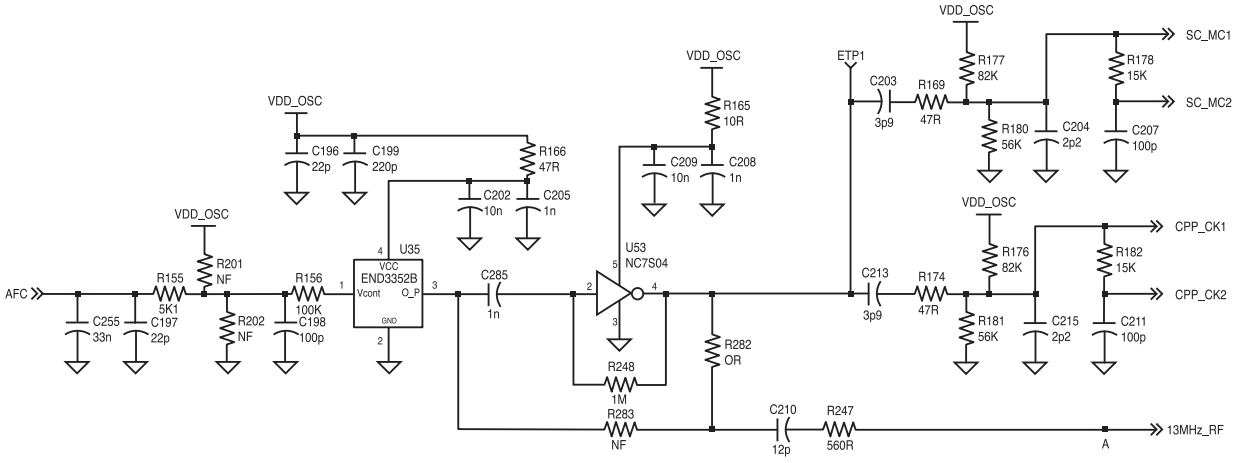
- **GSM: Pwr Lvl 11, Ch.62, 21dBm**
- **DCS: Pwr Lvl 5, Ch.699, 20dBm**



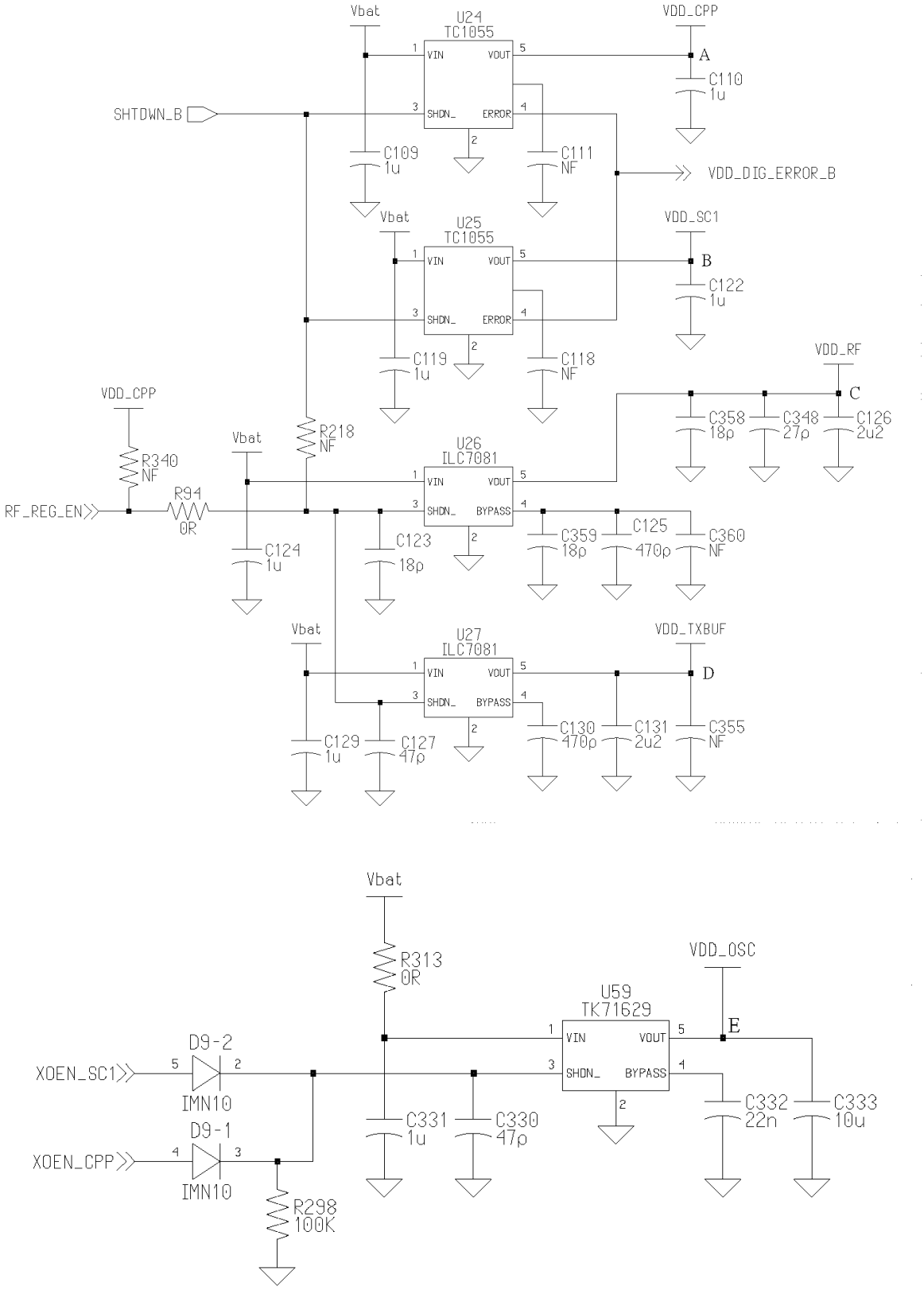
[Figure 2. Transmitter Block Diagram]



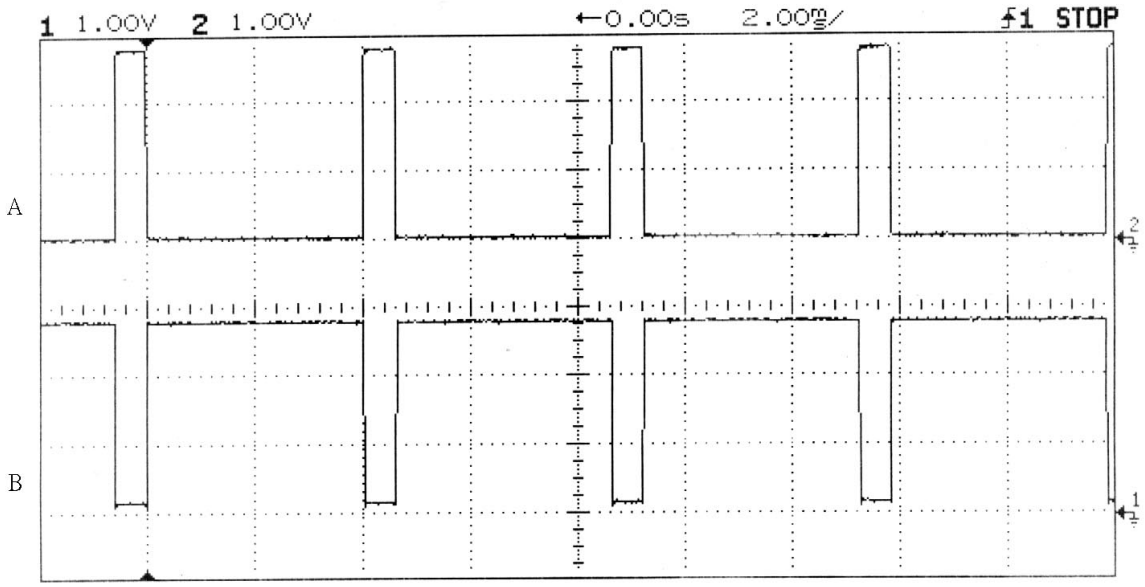
[Figure 3. Diplexer_Circuit]



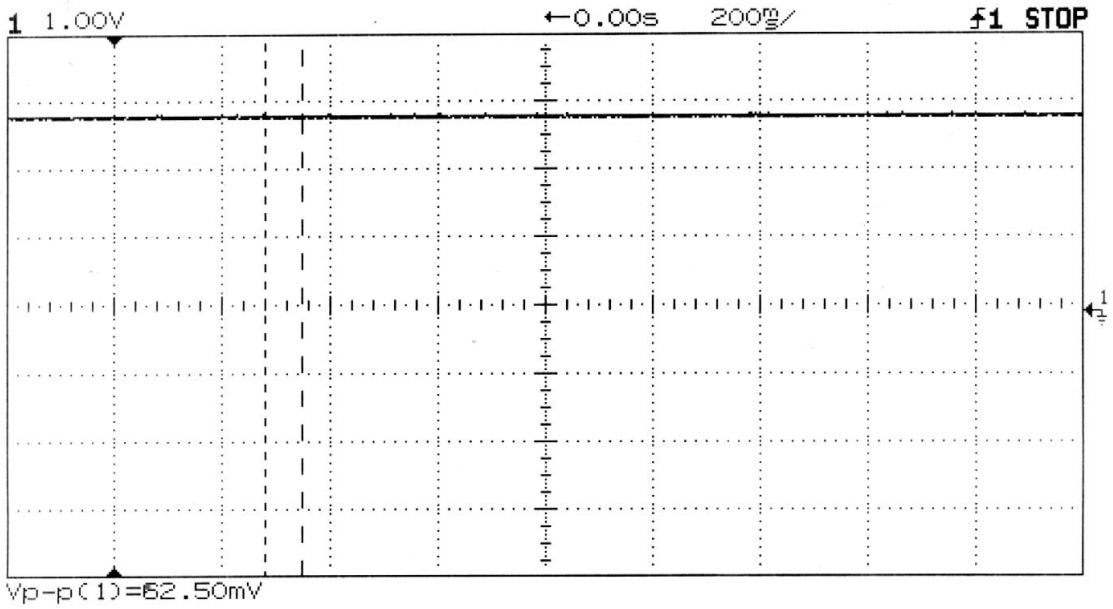
[Figure 4. System Clock]



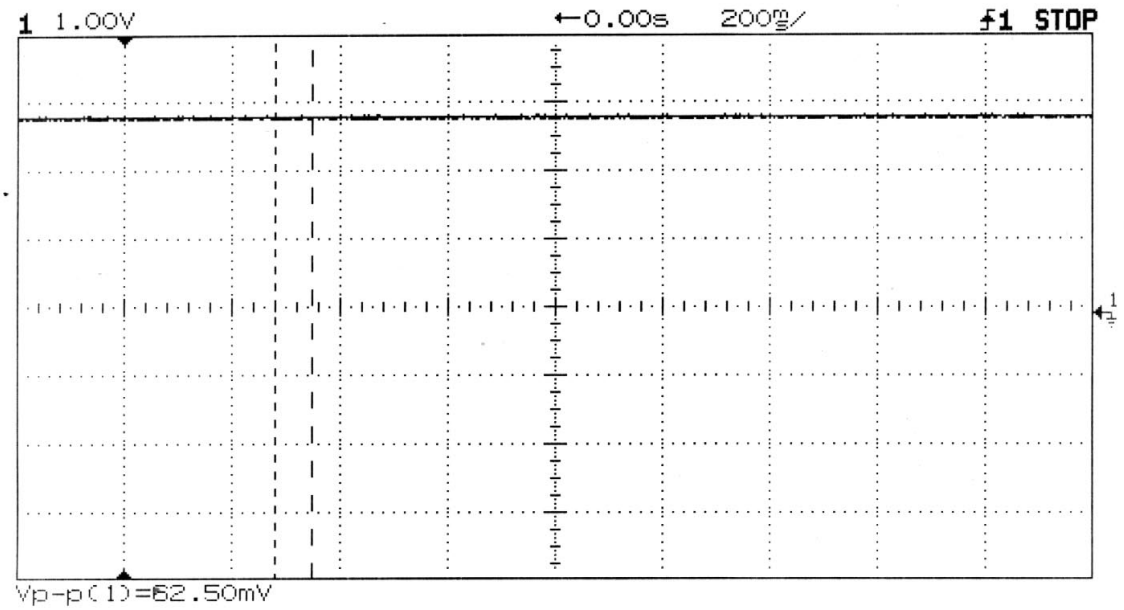
[Figure 5. Power_Supply_Circuit]



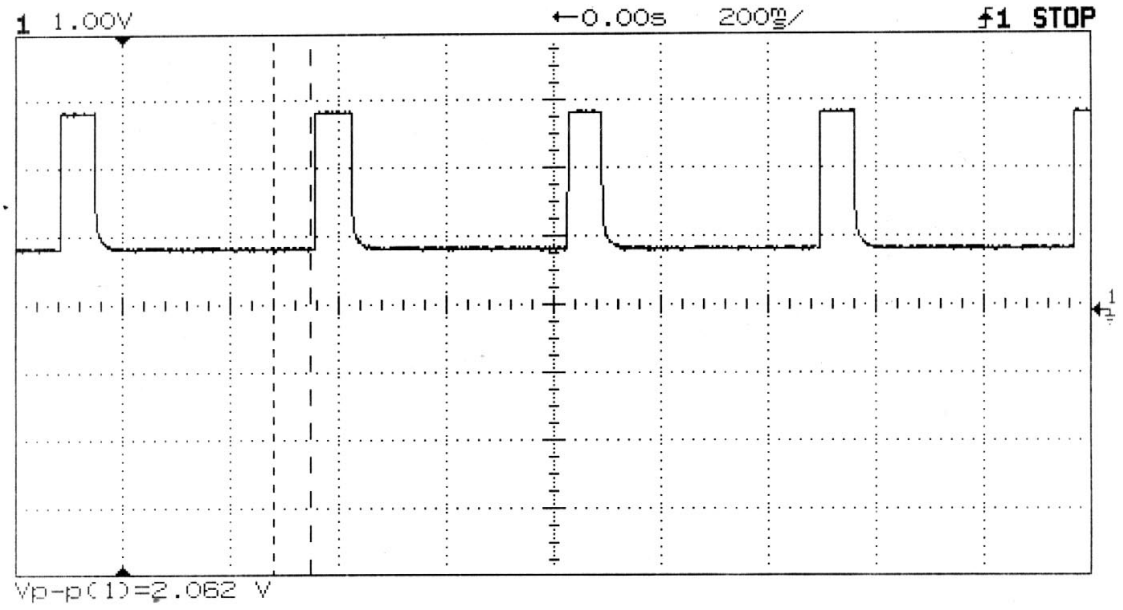
[Figure 6. The control signal of Diplexer (see Fig.3)]



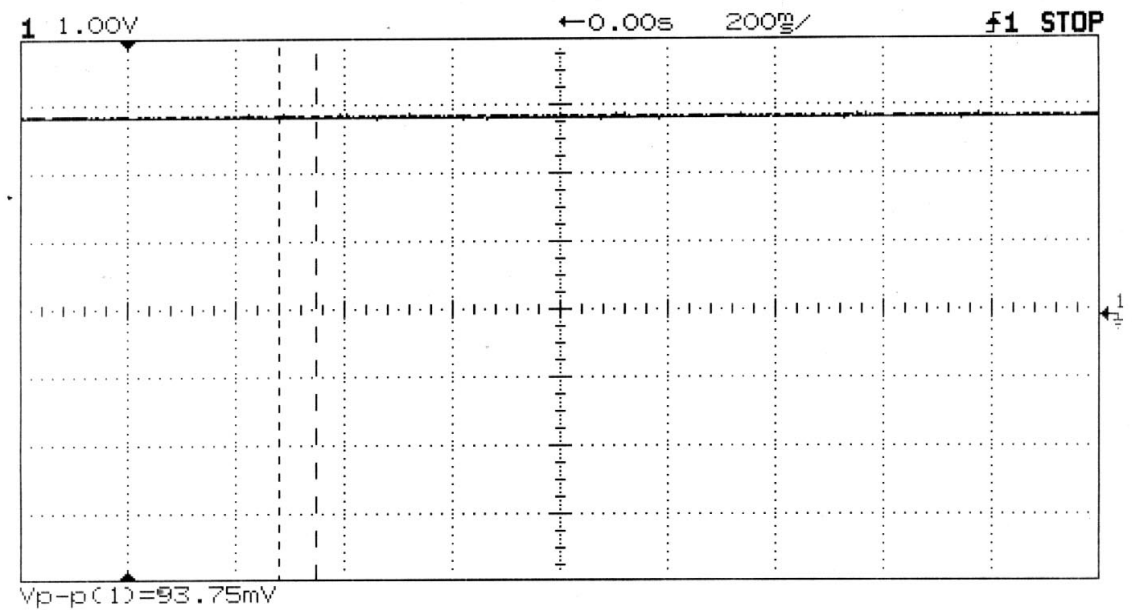
[Figure 7. VDD_CPP (see Fig.5)]



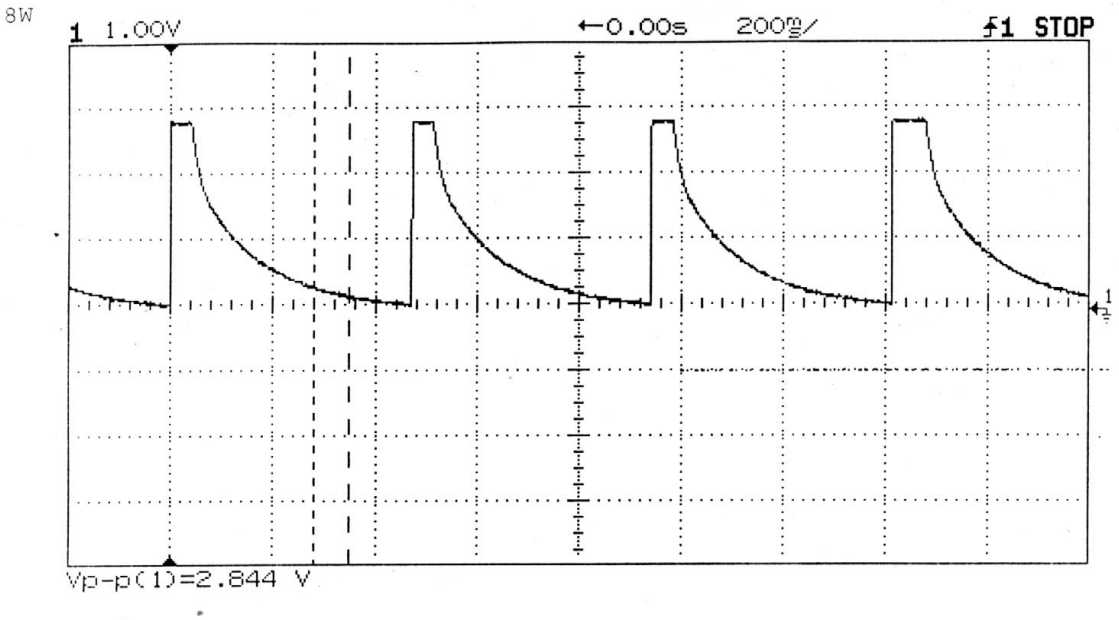
[Figure 8. VDD_SC1 (see Fig.5)]



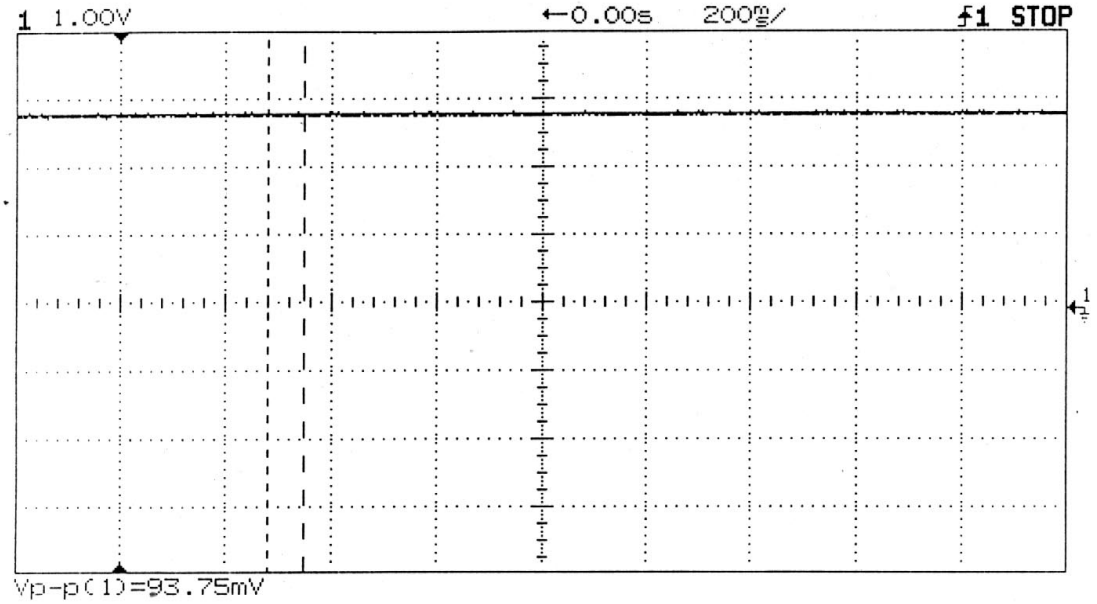
[Figure 9. VDD_OSC (the Tx is unable) (see Fig.5)]



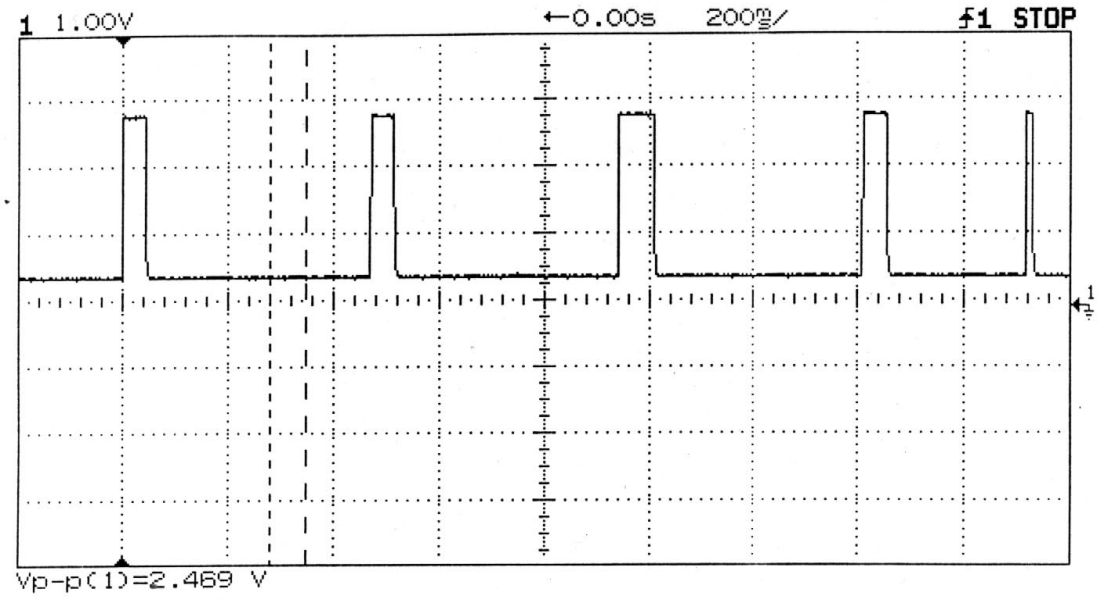
[Figure 10. VDD_OSC (the Tx is enable) (see Fig.5)]



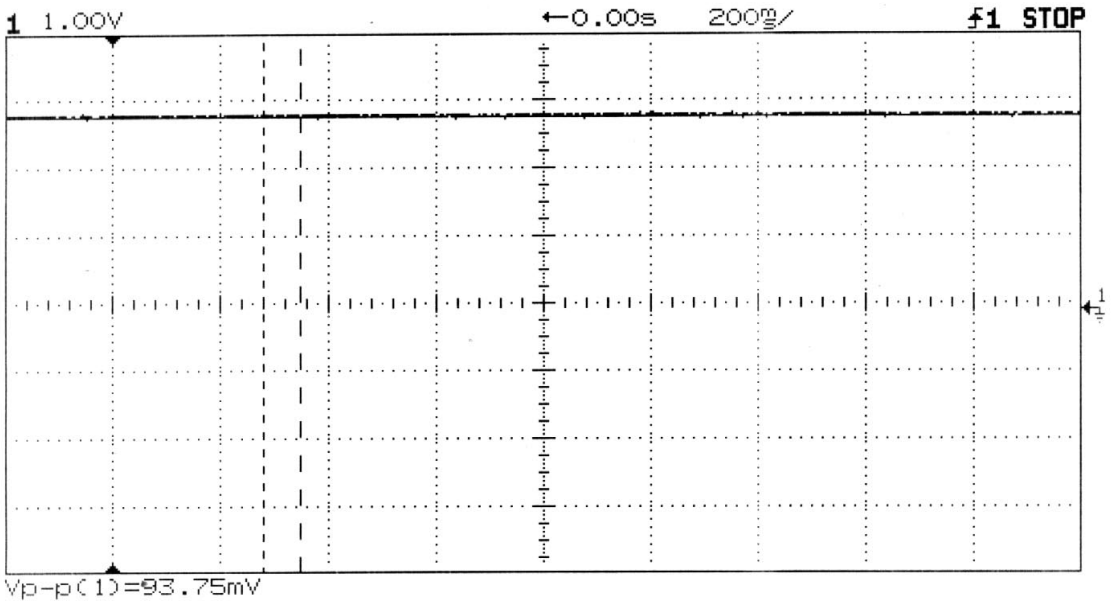
[Figure 11. VDD_RF (the Tx is unable) (see Fig.5)]



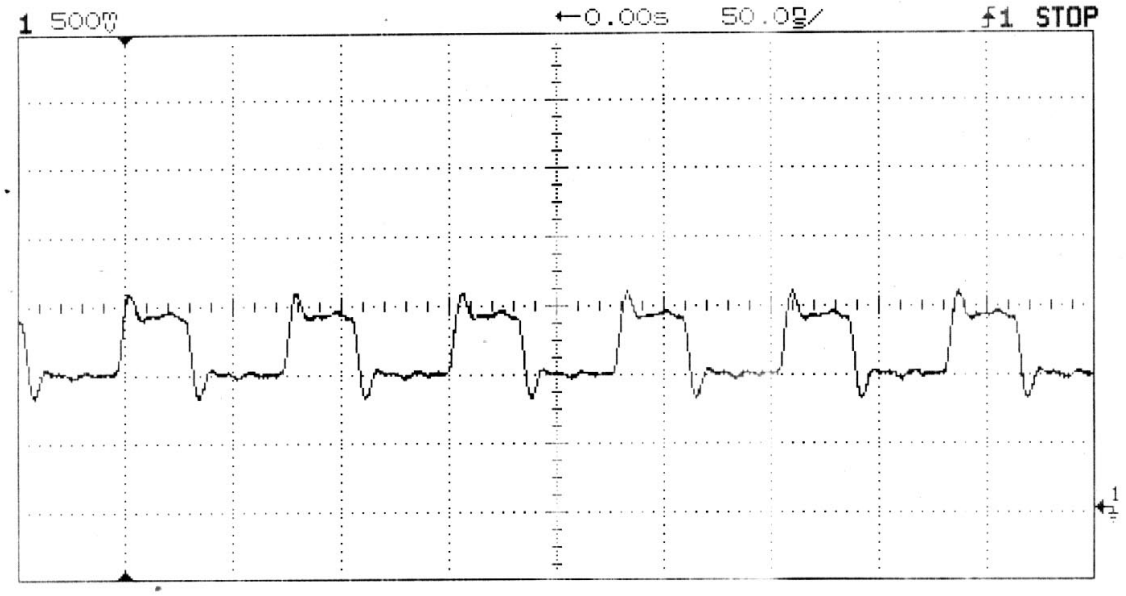
[Figure 12. VDD_RF (the Tx is enable) (see Fig.5)]



[Figure 13. VDD_Tx_BUF (the Tx is unable) (see Fig.5)]



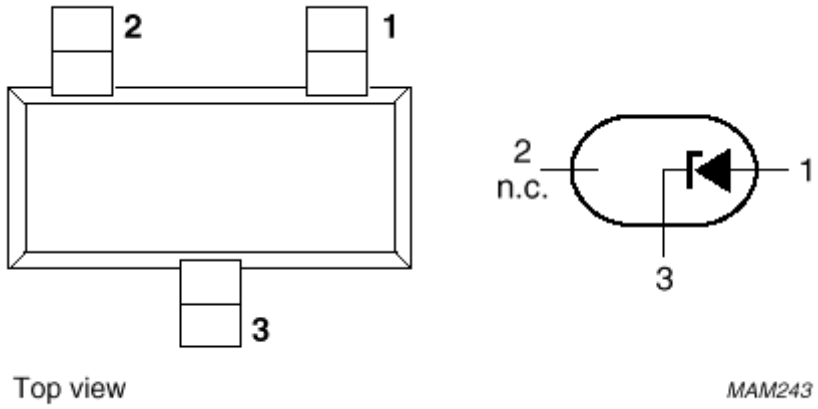
[Figure 14. VDD_Tx_BUF (the Tx is enable) (see Fig.5)]



[Figure 15. TCXO (13MHz_RF) (see Fig.4)]

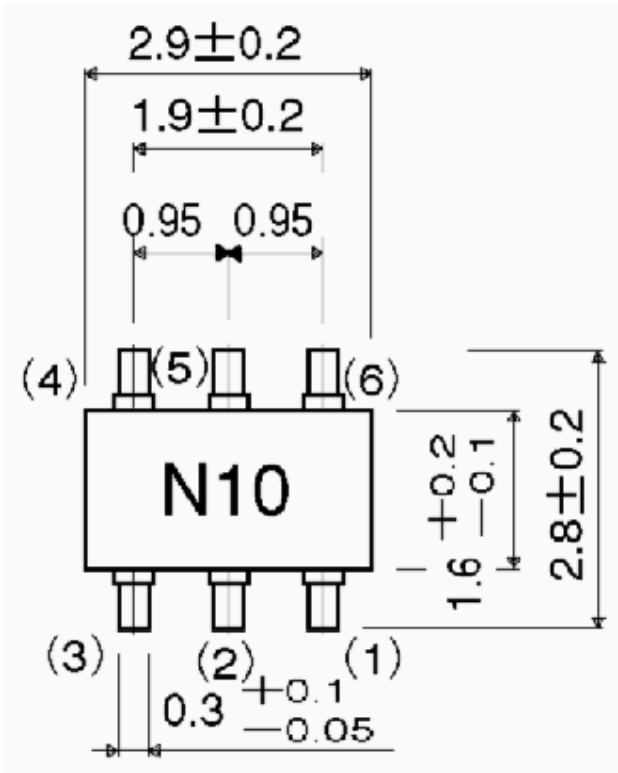
2-9. Dimensions of Main Components.

• BZX84_C4V3 D1



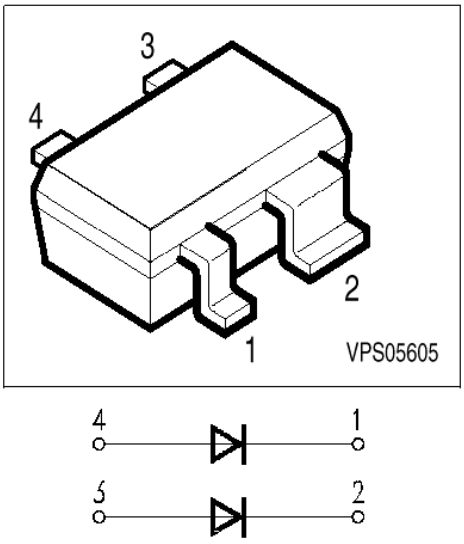
[Voltage regulator diodes]

• IMN10 D7 D8 D9



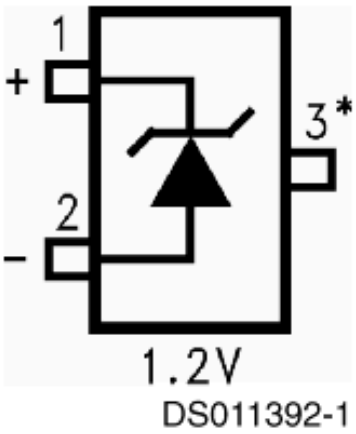
[Ultra high speed switching diode array]

• **BAT62-07W D5**



[Silicon Schottky Diode]

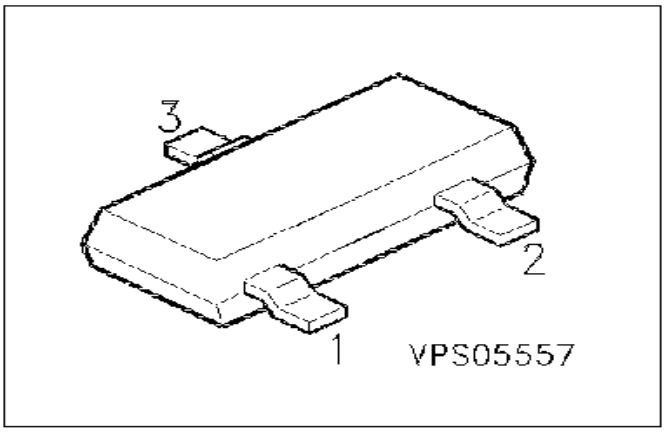
• **LM4041CIM3-1.2 D6**



[Precision Micropower Shunt Voltage Reference]

• BSS138 Q30

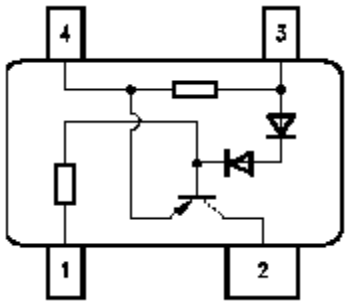
BSS 138

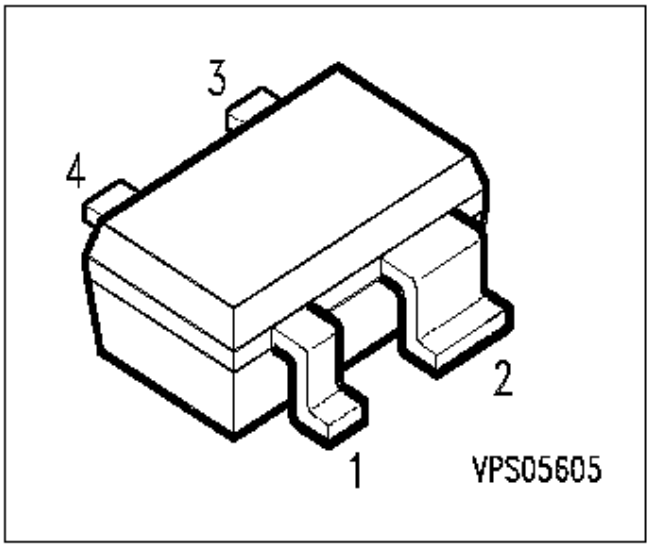


Pin 1	Pin 2	Pin 3
G	S	D

[SIPMOS Small-Signal Transistor]

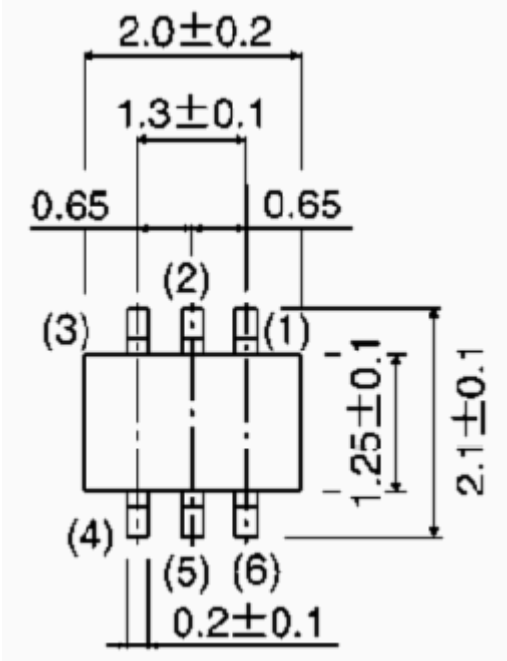
• BCR400W U40

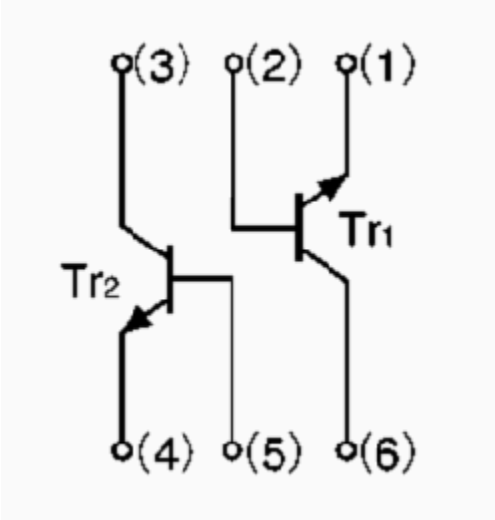




[Active Bias Controller]

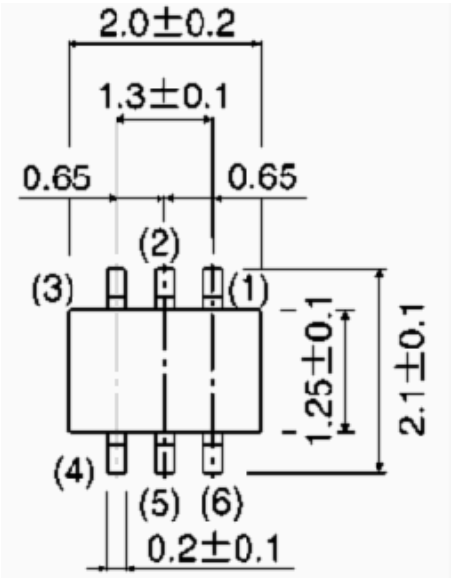
• **UMX1N Q5 Q28**

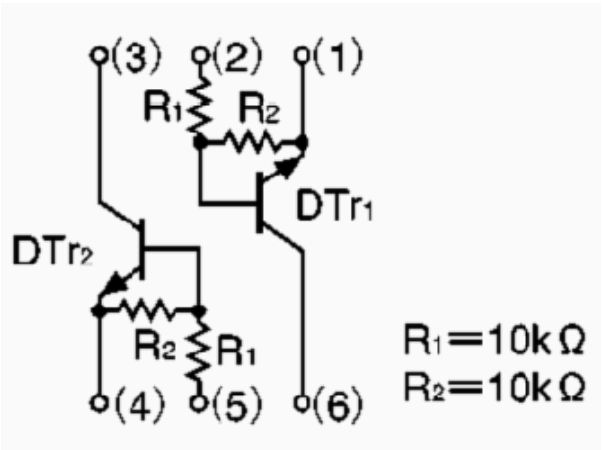




[General purpose transistor]

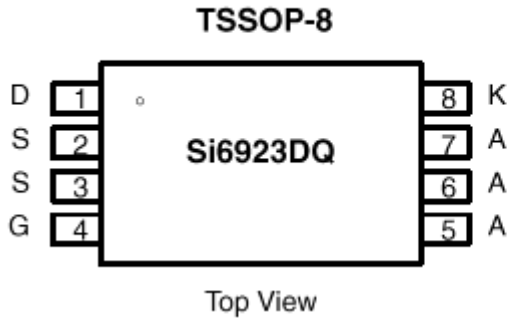
• **UMH11N Q27**

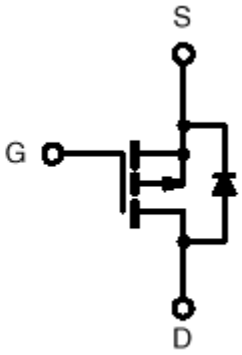




[General purpose (dual digital transistors)]

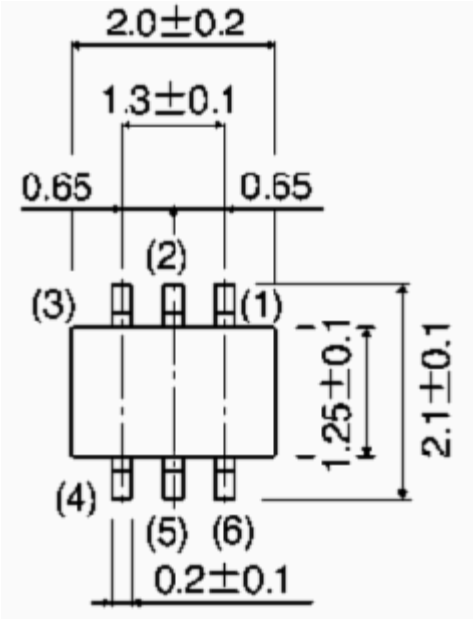
• Si6923DQ Q1

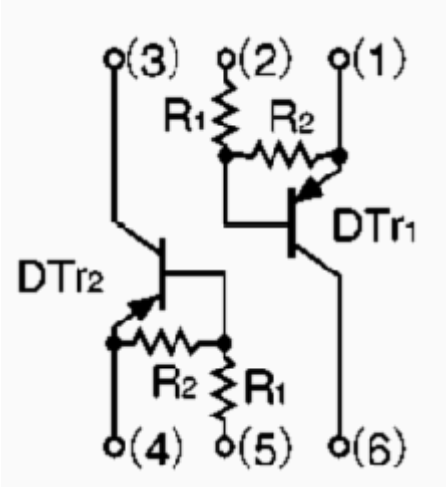




[P-Ch 2.5-V (G-S) MOSFET With Schottky Diode]

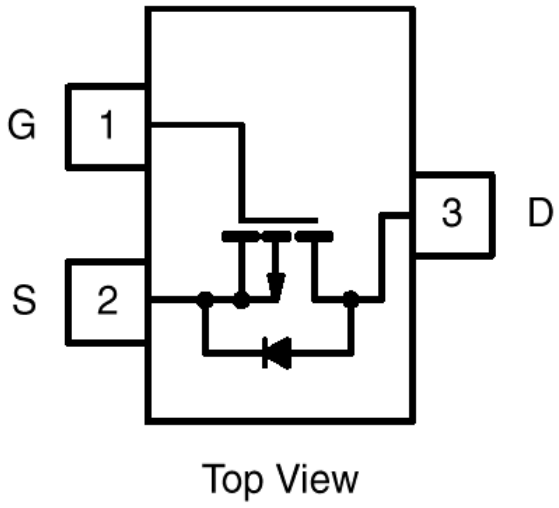
• UMB10N Q15





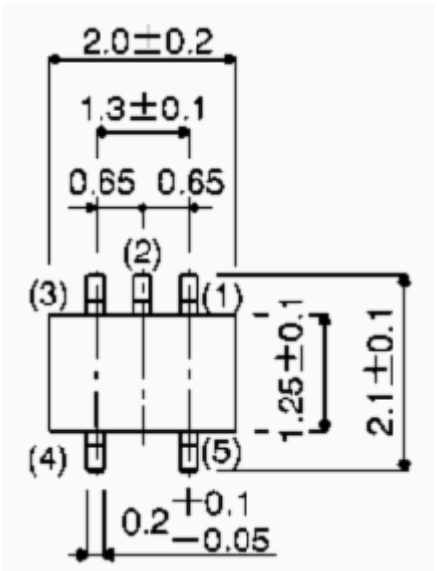
[General purpose (dual digital transistors)]

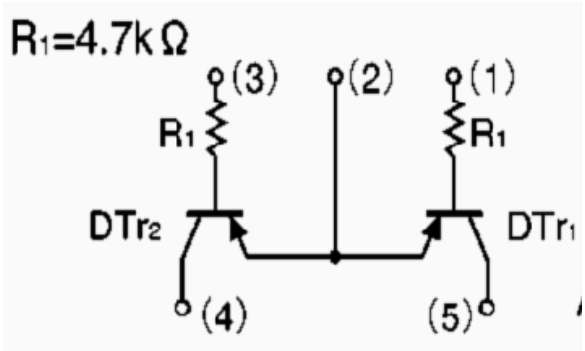
• **Si2301DS Q21 Q22**



[P-Channel 1.25-W, 2.5-V MOSFET]

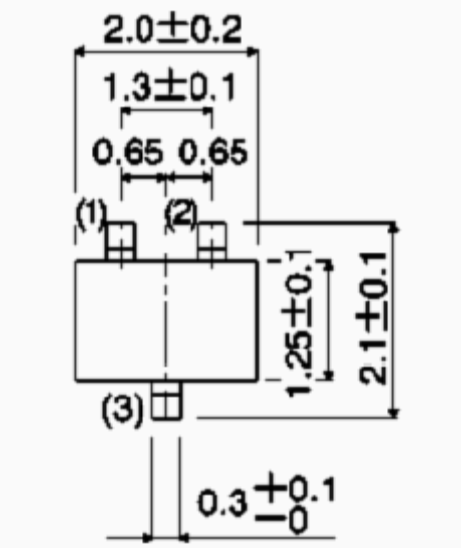
• **UMA3N Q29**





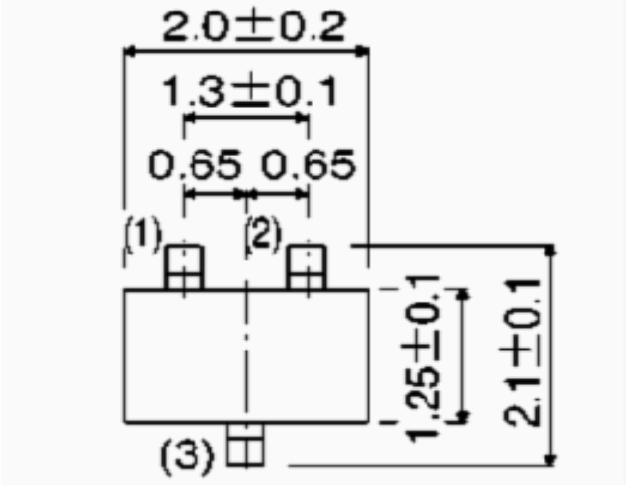
[Emitter common (dual digital transistors)]

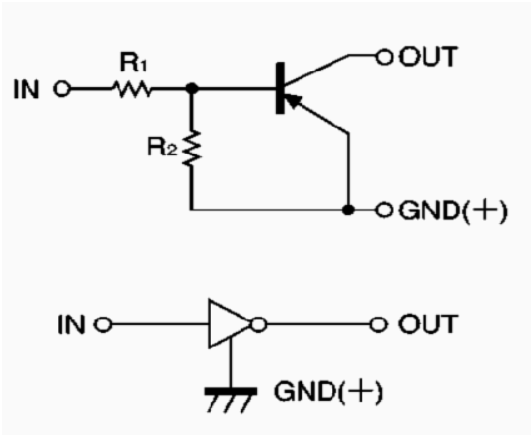
• 2SA1576A Q33



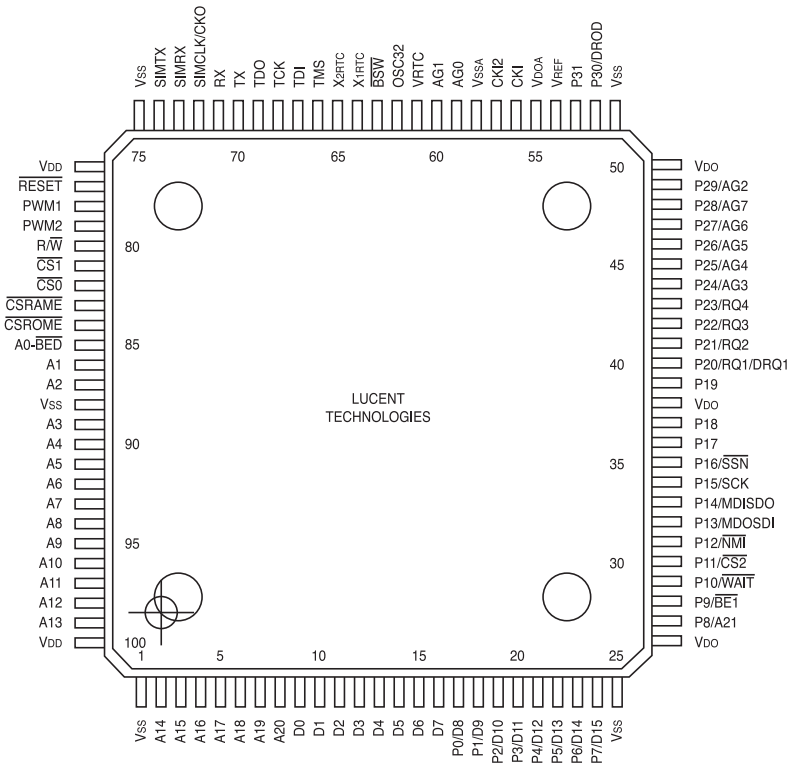
[General Purpose Transistor]

• DTA123JUA Q31

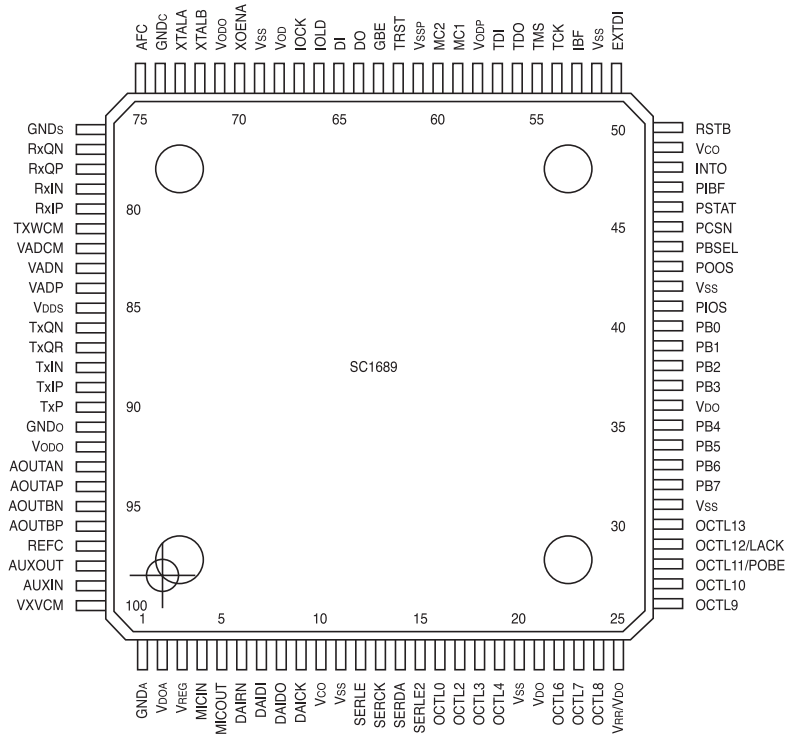




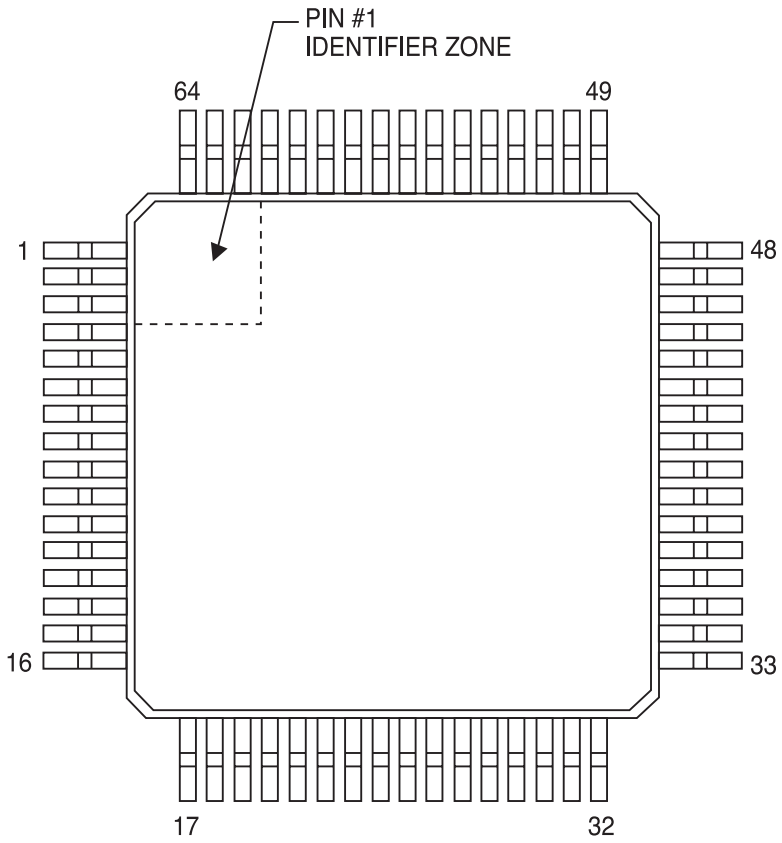
[Digital transistors (built-in resistors)]


VSS SIMTX SIMRX SIMCLK/CKO RX TX TDO TCK TDI TMS X2RTC X1RTC BSW OSC32 VRTC AG1 AG0 VSSA CKI2 CKI VDDA VREF P31 P30/DROD VSS
VDD RESET PWM1 PWM2 R/W CS1 CS0 CSRAME CSROME A0-BED A1 A2 VSS A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 VDD
VDO P29/AG2 P28/AG7 P27/AG6 P26/AG5 P25/AG4 P24/AG3 P23/RQ4 P22/RQ3 P21/RQ2 P20/RQ1/DRQ1 P19 VDO P18 P17 P16/SSN P15/SCK P14/MDISDO P13/MDOSDI P12/NMI P11/CS2 P10/WAIT P9/BE1 P8/A21 VDO
LUCENT TECHNOLOGIES
VSS A14 A15 A16 A17 A18 A19 A20 D0 D1 D2 D3 D4 D5 D6 D7 P0/D8 P1/D9 P2/D10 P3/D11 P4/D12 P5/D13 P6/D14 P7/D15 VSS

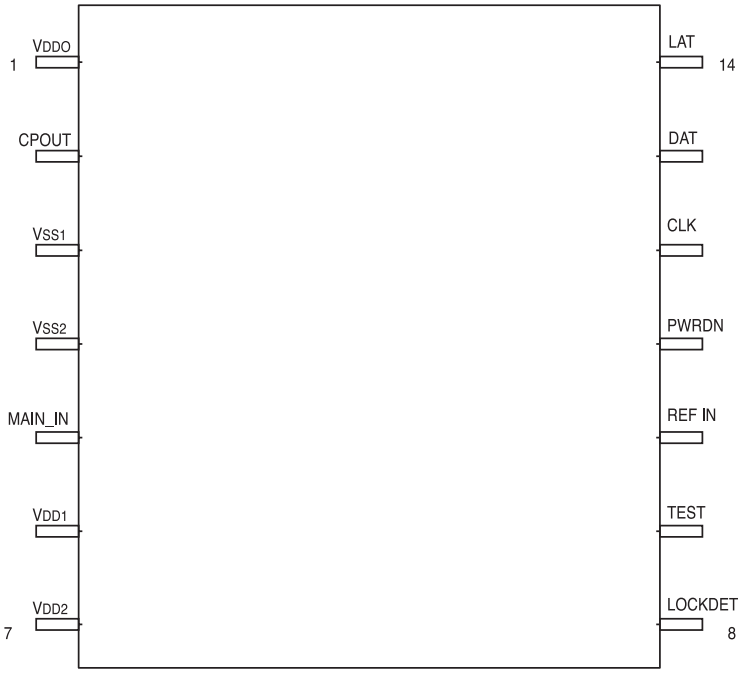
[CPP U15]


AFC GNDC XTALA XTALB VODO XOENA VSS VOD IOCK IOLD DI DO GBE TRST VSSP MC2 MC1 VODP TDI TDO TMS TCK IBF VSS EXTDI
GNDS RxQN RxQP RxIN RxIP TXWCM VADCM VADN VADP VDDS TxQN TxQR TxIN TxIP TxP GNDO VODO AOUTAN AOUTAP AOUTBN AOUTBP REFC AUXOUT AUXIN VXVCM
RSTB VCO INTO PIBF PSTAT PCSN PBSEL POOS VSS PIOS PB0 PB1 PB2 PB3 VDO PB4 PB5 PB6 PB7 VSS OCTL13 OCTL12/LACK OCTL11/POBE OCTL10 OCTL9
SC1689
GNDA VDDA VREG MICIN MICOUT DAIRN DAIDI DAIDO DAICK VCO VSS SERLE SERCK SERDA SERLE2 OCTL0 OCTL2 OCTL3 OCTL4 VSS VDO OCTL6 OCTL7 OCTL8 VRR/VDO

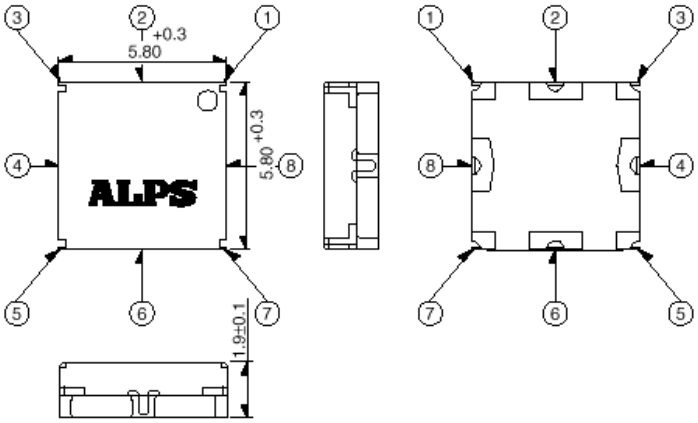
[SC1689 U1]



[W3020-ES3 U31]



[W3000-ES3 U19]

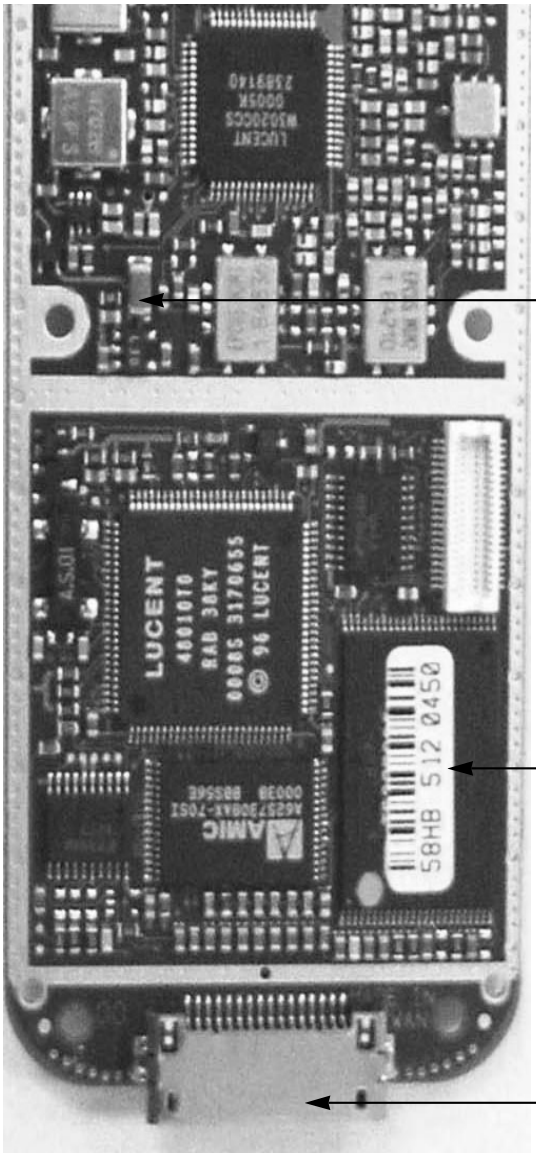


PAD NO.	CONTENTS
①	OUT
②	GND
③	GND
④	GND
⑤	VCLT
⑥	GND
⑦	Vcc
⑧	GND

[UCVE1X114A U42]

3. TROUBLE SHOOTING

3-1. Power Supply Failure



a) Failure:

- Problem with turning on Mobile phone.

➜ Solution:

1. Test the set's current by using battery simulator; observe the value of current used.
2. Case1:

   If the current is higher 300mA, please check C333. Or replace C333 if its resistance between 2Ω and 150Ω.
3. Case 2:

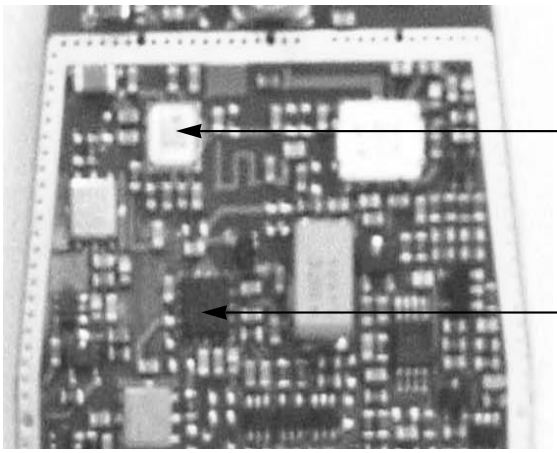
   - In case the current is between 35 and 45mA, the cause could be FLASH ROM (U12) defect. Please reinstall software.
   - If the software can't be reinstalled, please replace U12.

b) Failure:

- Problem with charging the battery
- Charge connector damage

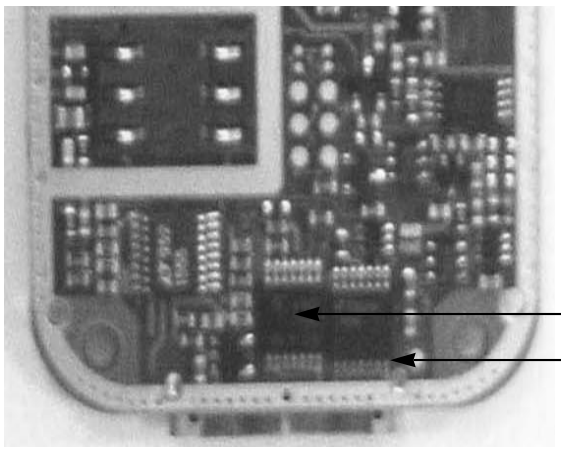
➜ Solution:

- J5 may be broken, replace the connector, J5.
- Control the temperature and air flow carefully.
- J5 may be a cold soldering. Please re-solder again.



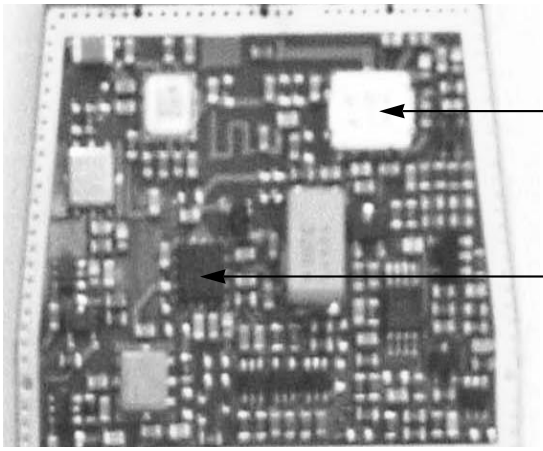
c) Failure/Solution:

- If the value of current looks like short circuit, please replace U9 or U23.



d) Failure/Solution:

- Check the voltage output of Pin1 of U41; the value should between 2.8V and 3.5.
- Please replace U41 or U39 if there is no output or value abnormal.



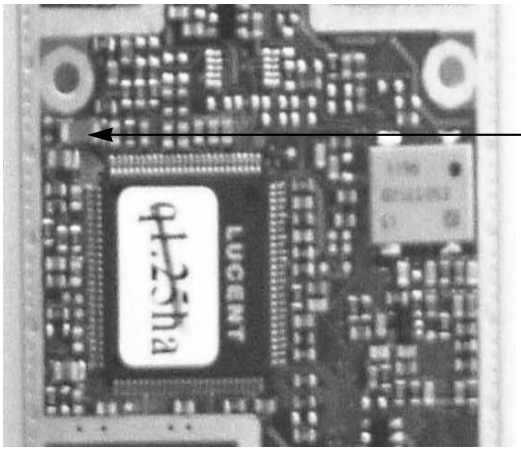
e) Failure:

- Over heated phone set and battery.
- Short suspend time.

➜ Solution:

- Test the set's current by using battery simulator; observe the value of current used. If the current is between 6 and 400mA, take out U9 or U32 and repeat above motions again. Replace U9 or U32 if new value is 0.

3-2. Voice Function Failure

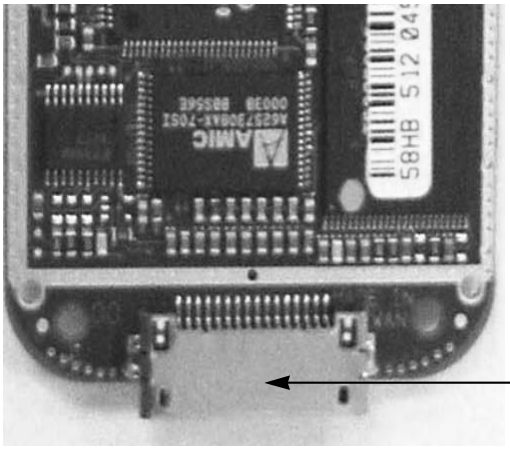


a) Failure:

- Microphone voice failure.

➜ Solution:

- Test the resistance of C18 capacitor by using multi-meter. Replace C18 if the testing value is lower than 18Ω.
- Replace Microphone if C18 is fine.



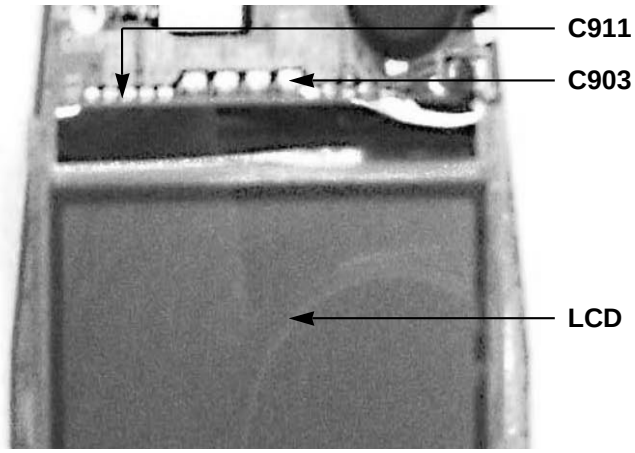
b) Failure:

- Hand free function failure

➜ Solution:

- J5 may be broken, replace the connector, J5.
- J5 may be a cold soldering. Please re-solder again.

3-3. Display Function Failure



a) Failure:

- No Display on LCD

➜ Solution:

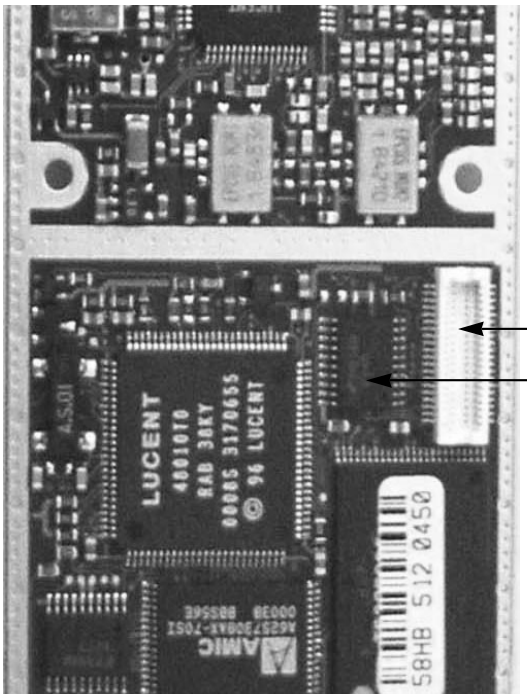
- Test the resistance of C903~C911 by using multi-meter, the value should be infinity. Replace the capacitor, which has any impedance.
- Otherwise, replace LCD module.

b) Failure:

- Broken LCD

➜ Solution:

- Replace whole LCD module.
- Solder the LCD module with care.

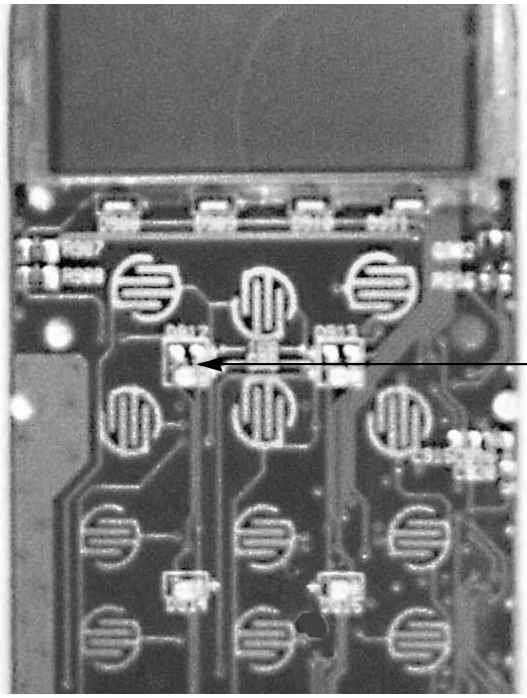


c) Failure:

- No Back Light

➜ Solution:

- Replace the LED that doesn't light up including any failing parts of LED.
- If all of LEDs fail, please check whether J1 has cold solder.
- Check the circuit trace on UIF board.



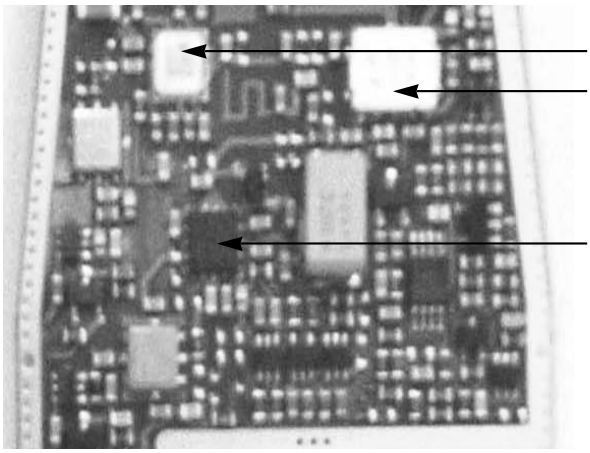
d) Failure:

- Fails on Dark display; Black line; Short of lines; Unstable brightness

➜ Solution:

- It may be caused by LCD defect. Please replace LCD.
- If the display is dark, replace LCD in advance. Otherwise, replace U48.

3-4. Transmission & Receiving Failure



a) Failure:

- Receiving signal failure

➜ Solution:

- Check the soldering of U23, U31.
- Otherwise replace U23, U31.

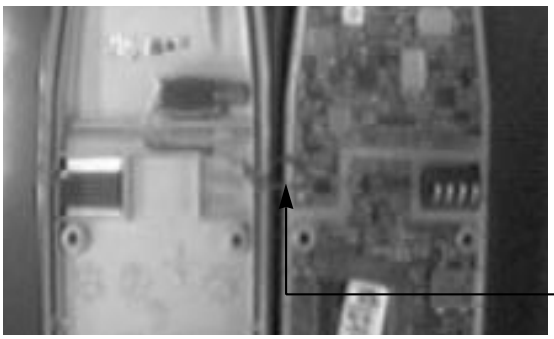
b) Failure:

- Transmission signal failure

➜ Solution:

- Check the soldering of U23, U9, and U32.
- Otherwise, replace U23, U9, and U32.

3-5. Other Function Failure

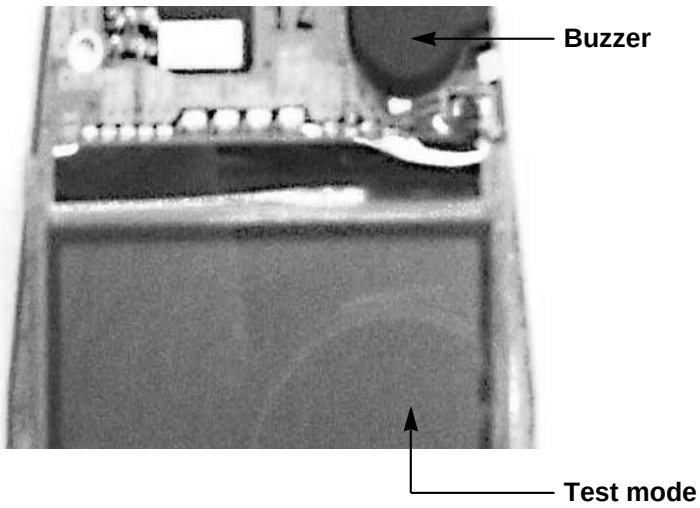


a) Failure:

- Vibrator function failure

➜ Solution:

- Check the wire of Vibrator. Arrange the wire carefully before assembling the main board.
- Check the Vibrator whether it is well fixed onto the lower case.



b) Failure:

- Key sound failure

➜ Solution:

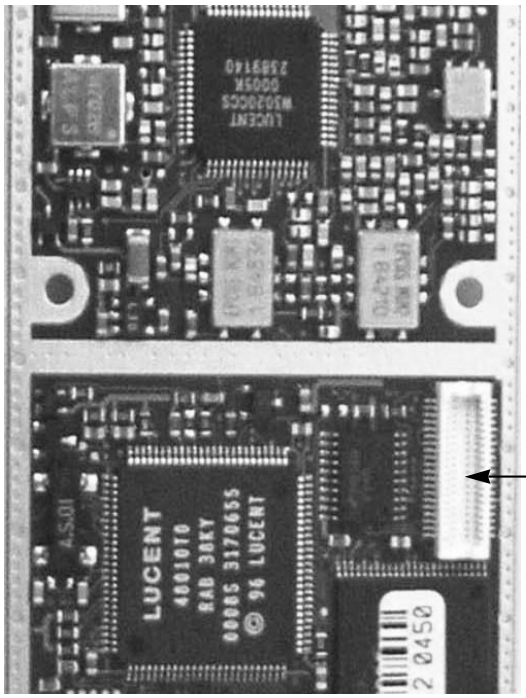
- Get into test mode and check the function of key sound. If it's fine in test mode, adjust the setting in user mode.

c) Failure:

- Weak Buzzer sound

➜ Solution:

- Replace Buzzer.

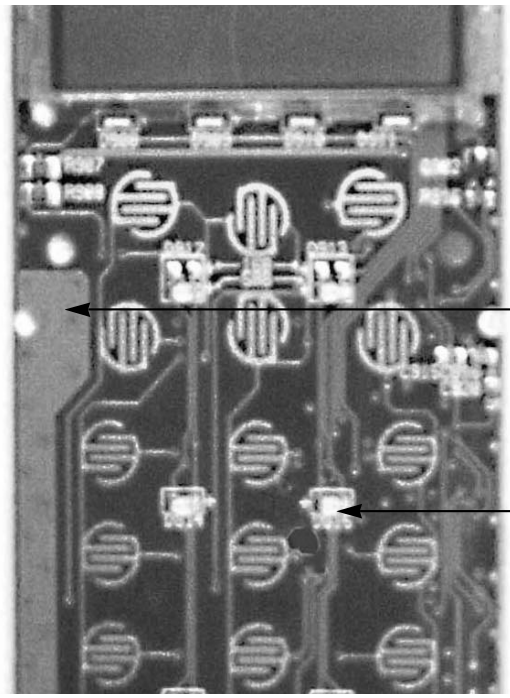


d) Failure:

- No Buzzer sound

➜ **Solution:**

- Check the soldering of J1.
- Check the trace insulator around screw hole on the UIF board.

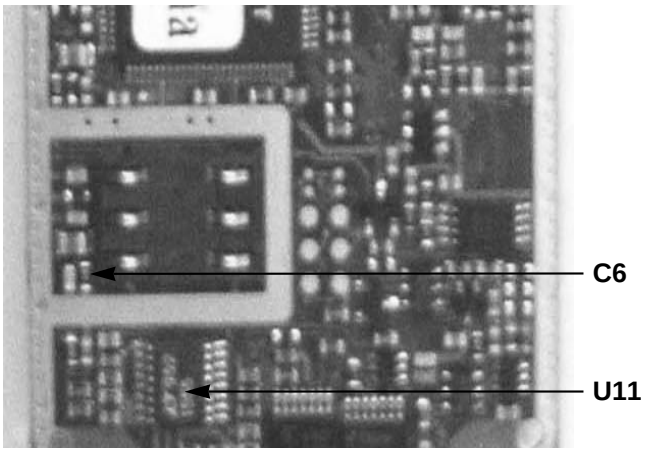


e) Failure:

Key light failure

➜ **Solution:**

- If any parts of LEDs are not working, please replace them with new LED.
- If all of LEDs fail, check both of J1 and UIF board, and see whether it is cold soldering or trace is broken.

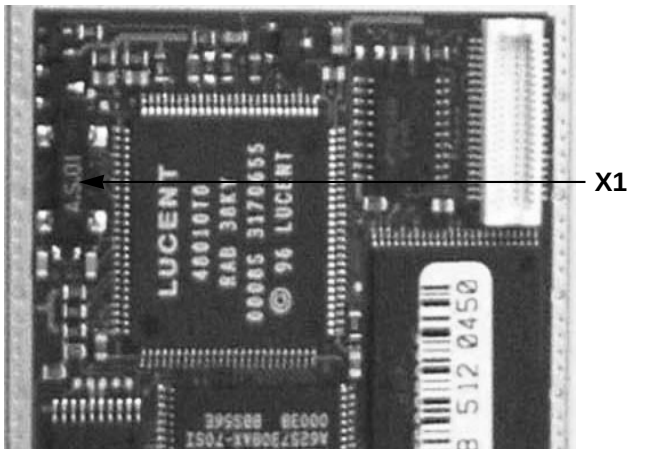


f) Failure:

- Problem with inserting card message

➜ **Solution:**

- Replace C6 capacitor if its resistance is from end to end is between 1Ω and 25Ω.
- If C6 is fine, please replace U11.



g) Failure:

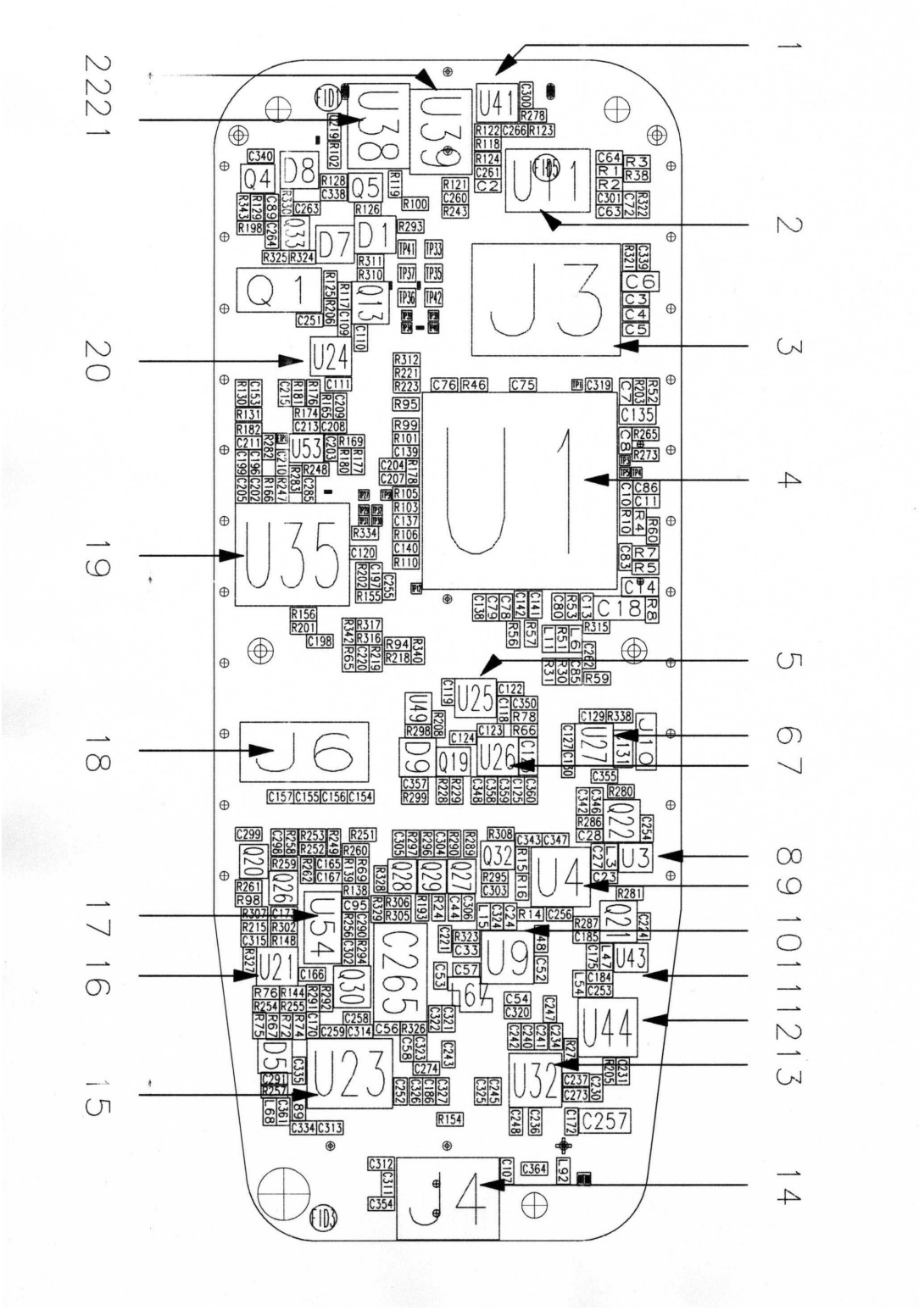
- Clock is not working

➜ **Solution:**

- Check X1 if soldering is ok.
- Replace X1crystal if there is no 32KHz frequency output.

4. TEST POINT DATA

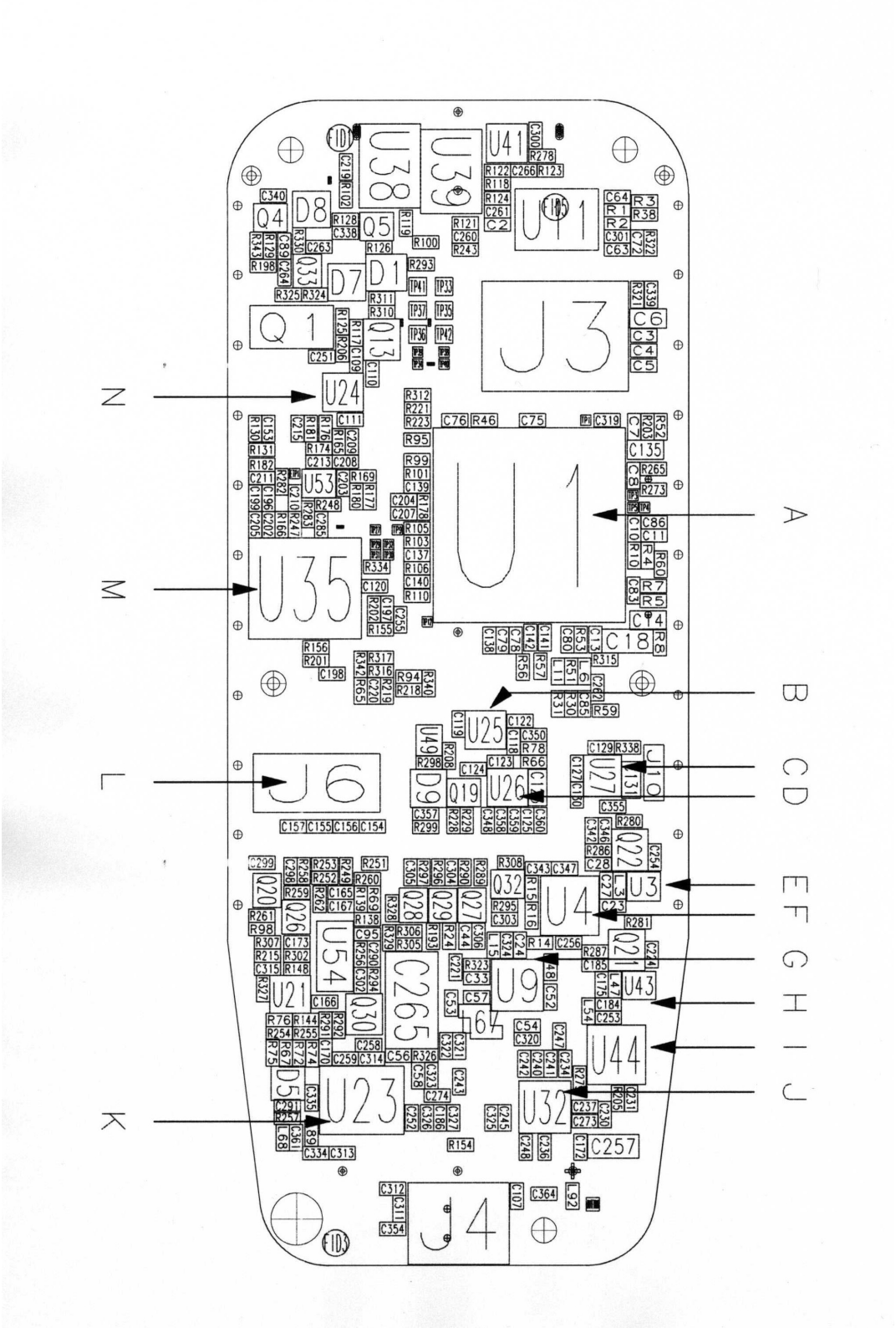
■ LG200 M/B (1-1)



■ Component list of LG200 M/B (1-2)

	Location	LG-200 M/B(1-2)
1	U41	2.9V Voltage comparator
2	U11	Provide SIM card power (3V ,5V)
3	J3	SIM LOCK
4	U1	SC 1689
5	U25	Provide power for U1(SC1689) V_{in}=3.8V V_{out}=2.85V
6	U27	Provide power for POWER Control Loop V_{in}=3.8V V_{out}=2.85V ± 0.5
7	U26	Provide power for U31 (W3020) V_{in}=3.8V V_{out}=2.85V
8	U3	GSM pre-amplifier
9	U4	GSM TX filter
10	U9	GSM power amplifier, for damage caused by 900 MHz network failure.
11	U43	DCS pre-amplifier
12	U44	DCS TX filter, for damage caused by 1800 MHz network failure.
13	U32	DCS power amplifier, for damage caused by 1800 MHz network failure.
14	J4	"Antenna switch, for damage caused by antenna transmit or receiving problem. Normal: Short Abnormal:Open"
15	U23	Multiplexer, for damage or cold soldering caused by transmit or receiving problem.
16	U21	OP AMP: control Power Control Loop
17	U54	Electronic switch: control Power Control Loop
18	J6	Battery connector
19	U35	Provide 13MHz TCXO, for damage caused by no network service.
20	U24	Provide power for main system U15(CPP) and Keyboard.
21	U38	Invert gate, for damage or cold soldering caused by Carkit failure, or Download data failure.
22	U39	NAND gate, for damage or cold soldering caused by total damage.

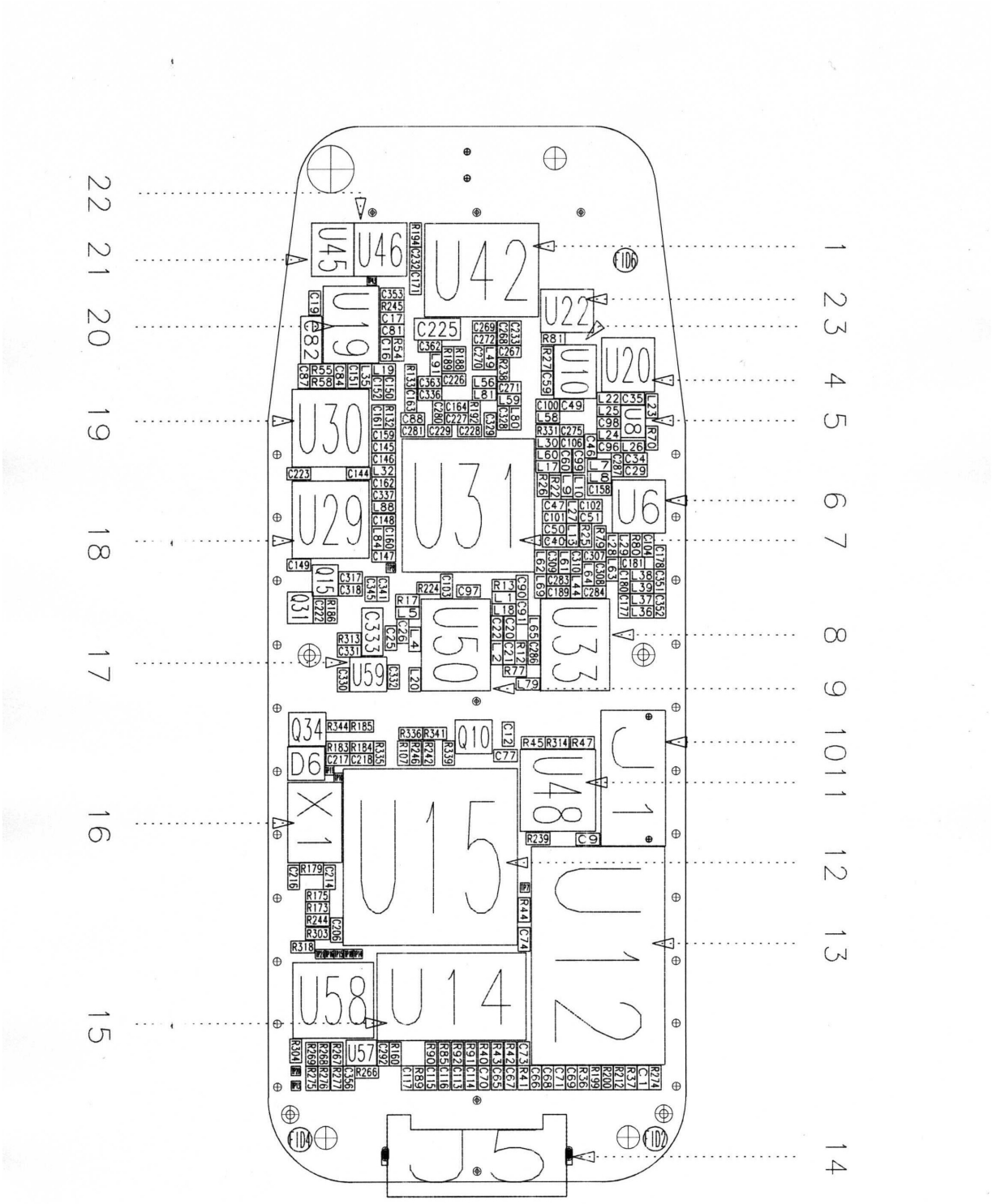
■ LG200 M/B (2-1)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
U1
U3
U4
U9
U21
U23
U24
U25
U26
U27
U32
U35
U38
U39
U41
U44
U49
U53
U54
C265
J3
J4
J6
J10
D1
D5
D7
D8
D9
Q1
Q4
Q5
Q13
Q19
Q20
Q21
Q22
Q26
Q27
Q28
Q29
Q30
Q32
Q33
C257

■ Component list of LG200 M/B (2-2)

	Location	LG-200 M/B(2-2)
A	U1	SC1689 measure : V_{out} of PIN2,10,21,25,36,49,54,58,66,68,71,85,92 = 2.85V Frequency of PIN59.60 = 13MHz
B	U25	SC1699 power measures : V_{in} of PIN1 = 3.8V, PIN3 = High, V_{out} of PIN5 = 2.85V
C	U27	POWER Control Loop power measures : V_{in} of PIN1 = 3.8V, PIN3 = High V_{out} of PIN5 =2.85V
D	U26	W3020 power = 3.8V, PIN3 = High, V_{out} of PIN5 = 2.85V
E	U3	GSM TX per amplifier measures PIN1= -29.09dBm, PIN4 = 3.97dBm
F	U4	GSM TX Filter measures, PIN2 = 2.47dBm, PIN6 = 2.82dBm
G	U9	GSM TX POWER AMP measures, PIN5,8,15,16 = 3.8V, PIN3 = 2.82dBm PIN10,11,12 = -9.53dBm
H	U43	DCS TX pre amplifier measures, PIN1 = -20.14dBm, PIN4 = -5.08dBm
I	U44	DCS TX Filter measures, PIN2 = -5.33dBm, PIN6 = -7.94dBm
J	U32	DCS TX POWER AMP measure PIN5,8,14,15,16 = 3.8V, PIN3 = -5.61dBm PIN10,11,12 = -23.44dBm
K	U23	Multipexer measures, PIN2,4,8,10 = 2.85V, PIN9 : GSM = -8.98dBm DCS = -16.2dBm
L	J6	Battery voltage measures, PIN1 = GND, PIN4 = +3.8V for all regulations.
M	U35	TCXO 13MHz measures, PIN3 = 13MHz, PIN4 = 2.85V
N	U24	CPP power measures, PIN1 = 3.8V, PIN3 = High, V_{out} of PIN5 = 2.85V

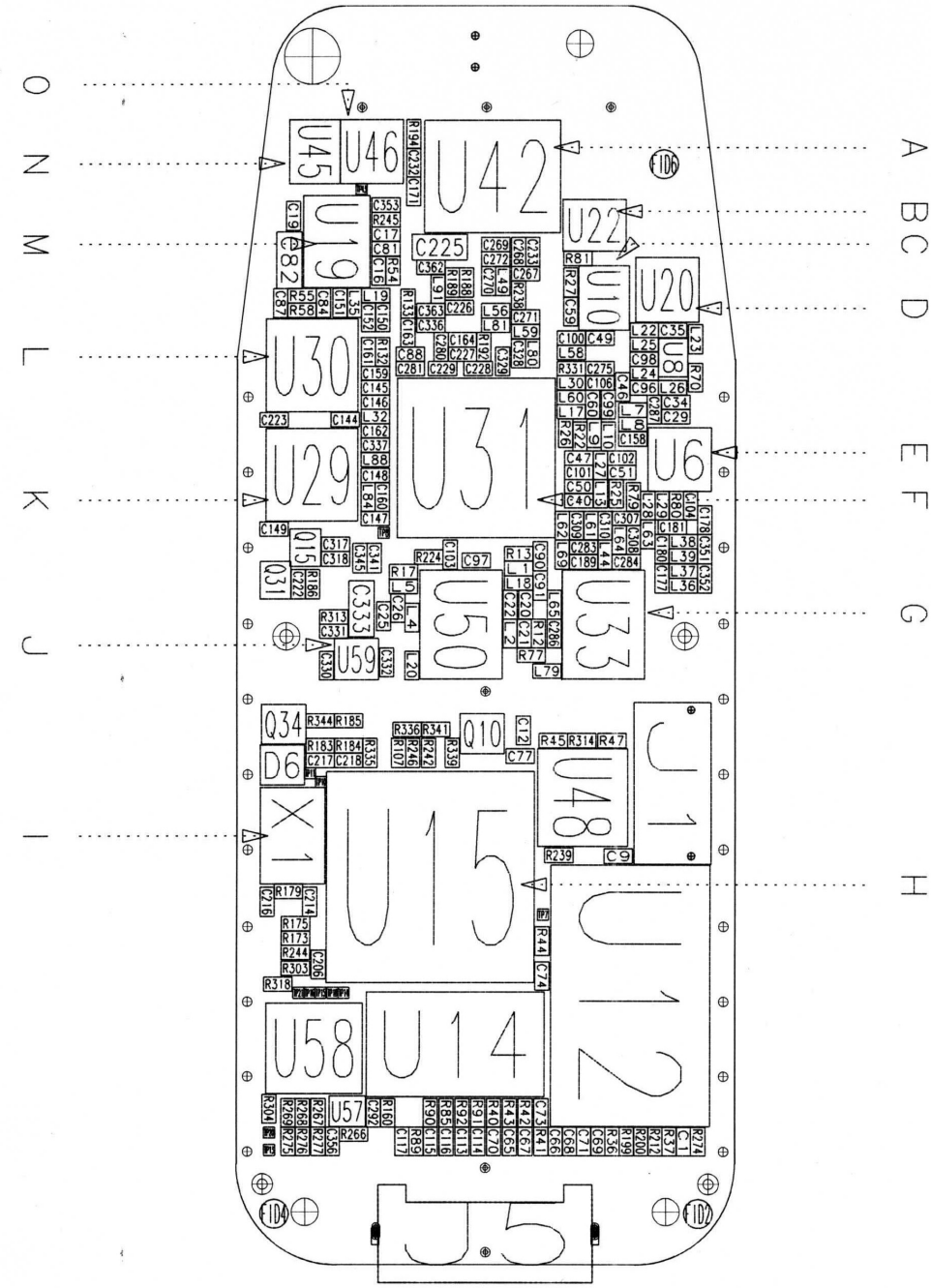
■ LG-200 M/B (3-1)

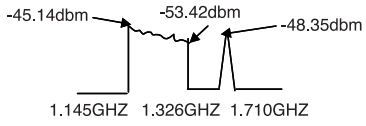

22 21 20 19 18 17 16 15
1 2 3 4 5 6 7 8 9 10 11 12 13 14
U45
U46
U42
U22
U19
U10
U20
U30
U8
U31
U6
U29
U50
U33
U59
U48
U15
U12
U58
U14
U57
J5
Q34
D6
X1
Q10
Q15
Q31
C333
FID6
FID4
FID2

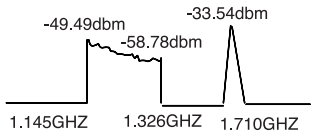
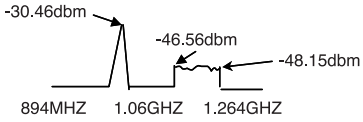
■ Component list of LG-200 M/B(3-2)

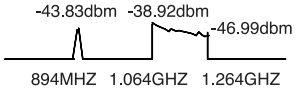
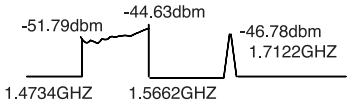
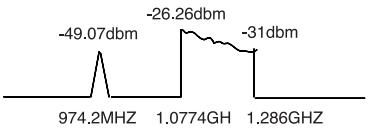
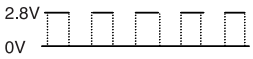
	Location	LG-200 M/B(3-2)
1	U42	Local OSC Vco,540MHz
2	U22	DCS receive filter
3	U10	GSM receive filter
4	U20	DCS transmit filter
5	U8	DCS transmit-couple circuit
6	U6	GSM transmit filter
7	U31	RF signal processor, for failure during network service or receiving/transmiting data
8	U33	IF filter, GSM:270 MHz, DCS:180 MHz
9	U50	270 MHz TX FILTER
10	J1	Key pad connector
11	U48	Bus buffer
12	U15	CPP: for the damage or cold soldering caused by charging problem or no voice response, use enable pin to check control status.
13	U12	Flash Memory: for any damage, cold soldering or data loss
14	J5	Connector of handsfree and charge in Carkit : for damage caused by failure of handfree or charging
15	U14	SRAM: for any damage or cold soldering
16	X1	It provides sleep mode(Output Frequency = 32.768KHZ) for damage or bad features caused by dead clock
17	U59	Its Output Frequencies and V_{in} are : 13MHz in TCXO; 540MHz in VCO; GSM BAND VCO; W3000(PLL IC); Vin of power supply provided by 13MHz = 3.8V
18	U29	DCS TX VCO 1530MHz ~ 1610MHz
19	U30	GSM TX VCO 1150MHz ~ 1230MHz
20	U19	W3000(PLL phase lock) : for damage caused by receiving failure
21	U45	GSM RX fliter, for damage caused by receving failure of 900MHz
22	U46	DCS RX fliter, for damage caused by receving failure of 1800MHz

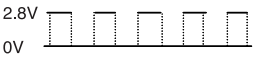
■ LG-200 M/B (4-1)

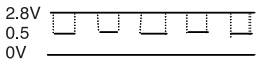
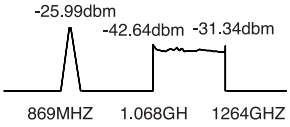

O N M L K J I
A B C D E F G H
U45
U46
U42
U22
U19
U10
U20
U30
U8
U31
U6
U29
U50
U33
U59
U15
U48
U12
U58
U14
U57
J5

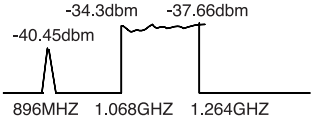
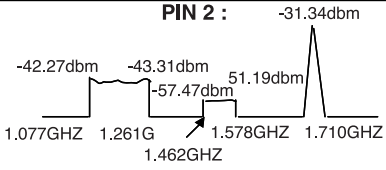
<table>
<tr><th colspan="3">LG-200 M/B(4-2)</th></tr>
<tr><td>A</td><td>U42</td><td>Local OSC measures; PIN1 = 2.85V; PIN6 = 540MHz at receive/transmit mode</td></tr>
<tr><td>B</td><td>U22</td><td>measure PIN2:
 

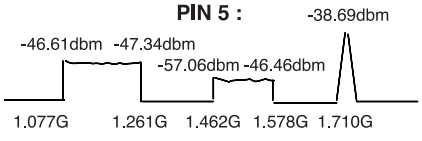
measure PIN5:
 
</td></tr>
<tr><td rowspan="2">C</td><td rowspan="2">U10</td><td>GSM RX filter</td></tr>
<tr><td>measure PIN 2:
 

measure PIN 5:
 
</td></tr>
<tr><td>D</td><td>U20</td><td>DCS TX filter measures; PIN2 = -21.5dBm, PIN6 = -24.33dBm</td></tr>
<tr><td>E</td><td>U6</td><td>GSM TX filter measures; PIN2 = -9.07dBm, PIN3 = -8.07dBm</td></tr>
<tr><td>F</td><td>U31</td><td>W3020(RF signal processor) measures; PIN9,10,13,26,20,37,43,49,58 = 2.85V</td></tr>
<tr><td>G</td><td>U33</td><td>U33 measures; GSM(270MHz) = -74dBm, DCS(180KHz) = -75dBm</td></tr>
<tr><td>H</td><td>U15</td><td>U15 measures; PIN 26,38,50,76,100,42,55 = 2.85V, PIN 62,64,65 = 32.768KHZ</td></tr>
<tr><td>I</td><td>X1</td><td>X1(CLOCK generator) measures; PIN4 = 32.768MHz</td></tr>
<tr><td>J</td><td>U59</td><td>13MHz Power source measures; V_{in} of PIN1 = 3.8V; PIN3 = High,
V_{out} of PIN5 = 2.85V</td></tr>
<tr><td rowspan="2">K</td><td rowspan="2">U29</td><td>DCS TX VCO measures; PIN7 = 2.85V at DCS transmit mode</td></tr>
<tr><td>measure PIN 1:
 
</td></tr>
<tr><td rowspan="2">L</td><td rowspan="2">U30</td><td>GSM TX VCO measures; PIN7 = 2.85V at GSM transmit mode</td></tr>
<tr><td>PIN 1:
 
</td></tr>
<tr><td rowspan="2">M</td><td rowspan="2">U19</td><td>PLL measures; PIN1,6,7 = 2.85V; PIN10 = 13MHz</td></tr>
<tr><td>PIN 12
 

PIN 13
 

PIN 14
 
</td></tr>
<tr><td rowspan="2">N</td><td rowspan="2">U45</td><td>GSM RX filter</td></tr>
<tr><td>PIN 2 :
 

PIN 5 :
 
</td></tr>
<tr><td rowspan="2">O</td><td rowspan="2">U46</td><td>DCS RX filter</td></tr>
<tr><td>PIN 2 :
 

PIN 5 :
 
</td></tr>
</table>

5. ASSEMBLY INSTRUCTIONS

1. Remove battery pack

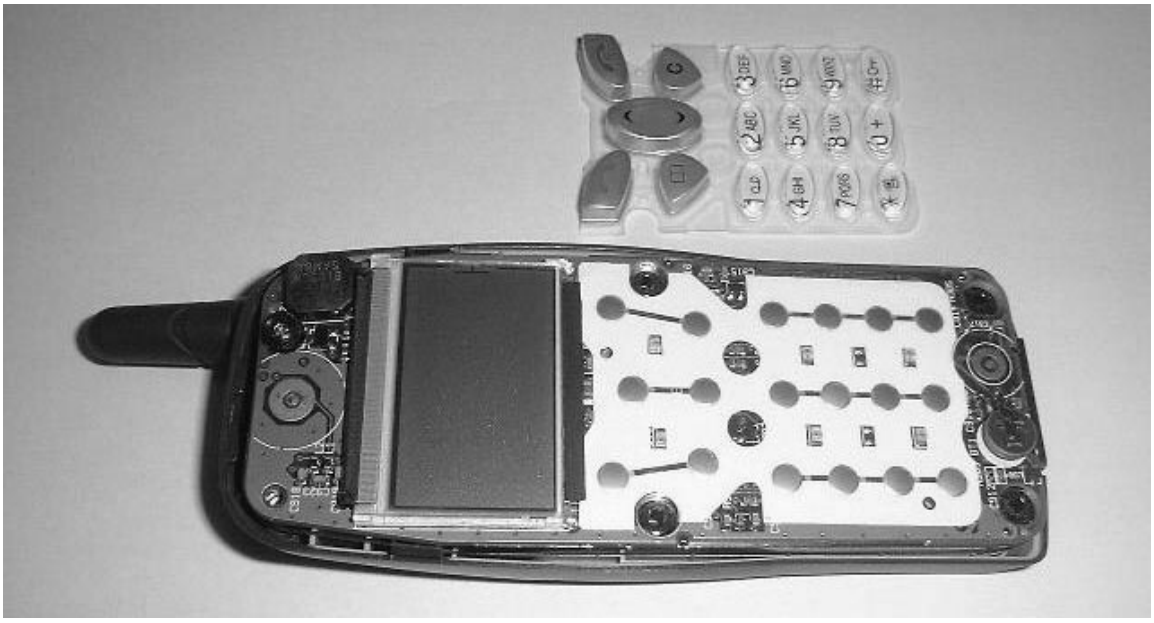
2. Remove screws

There are 4 screws in total

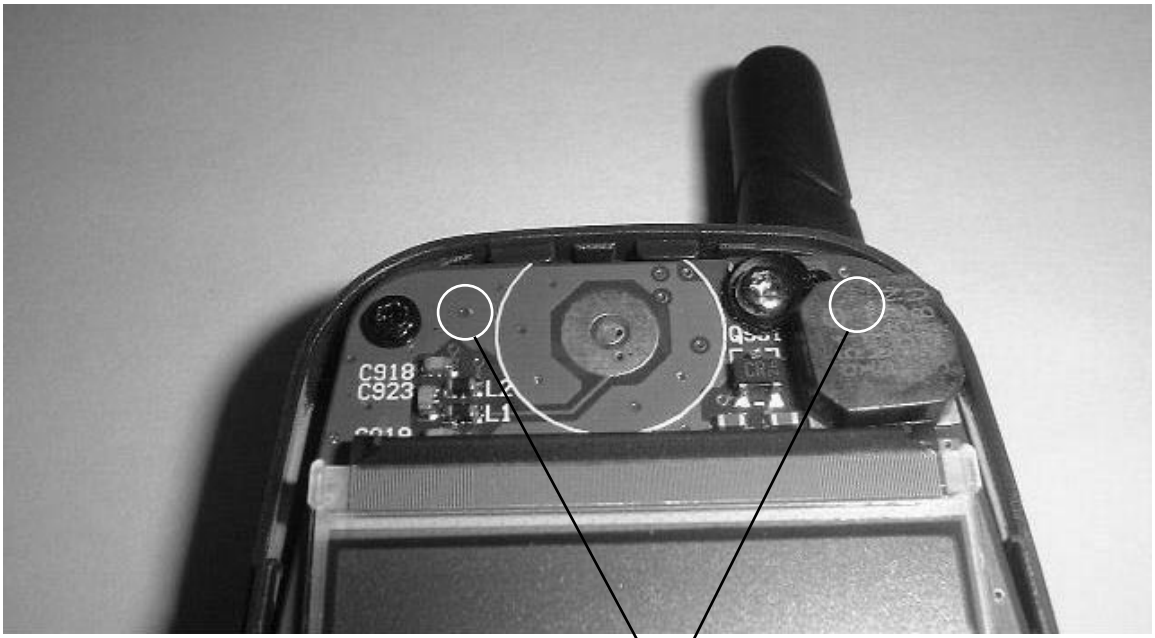
3. Turn handset up

4. Take off front panel

5. Take off keypad



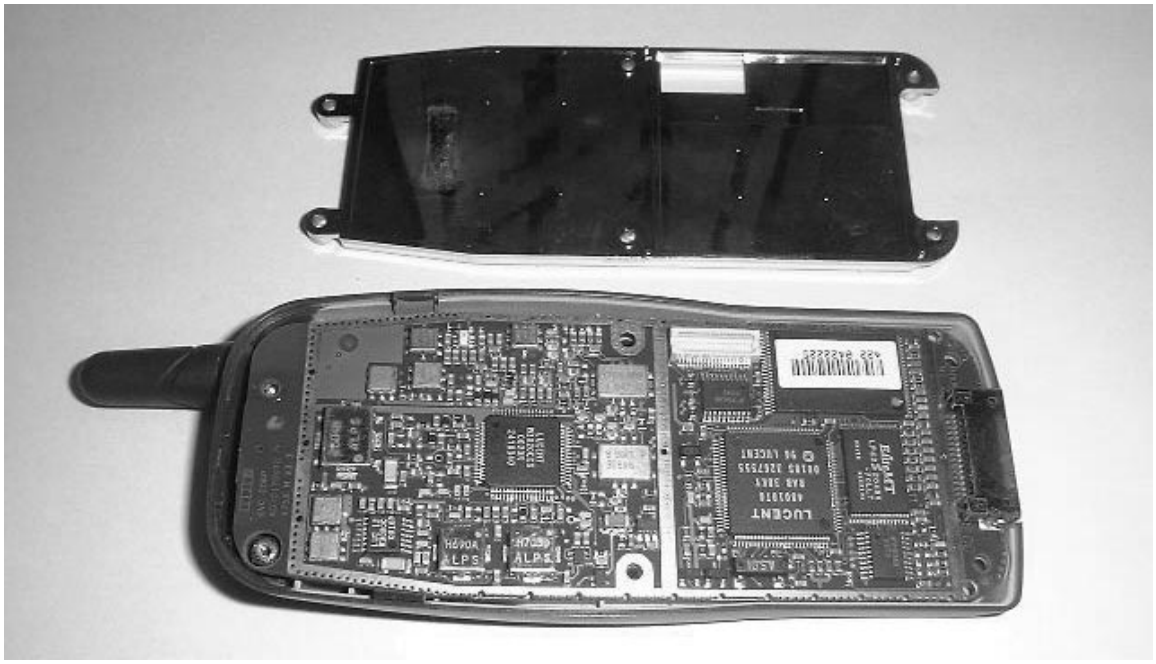
6. Remove screws



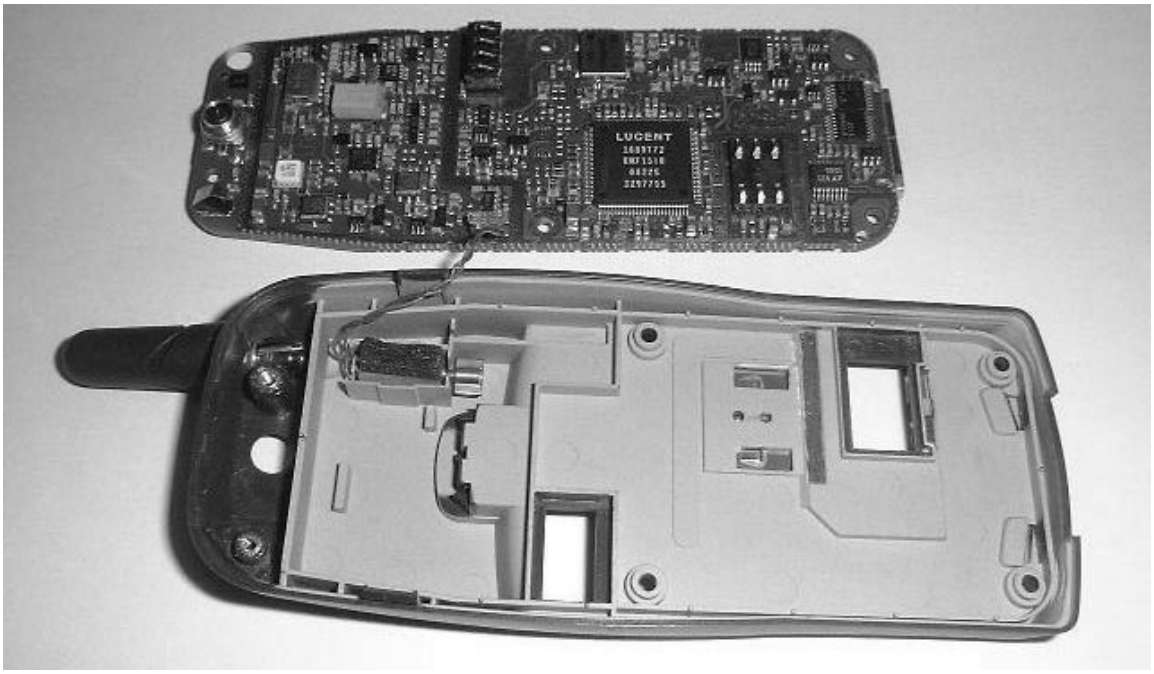
There are 2 screws in total

7. Take off UIF board

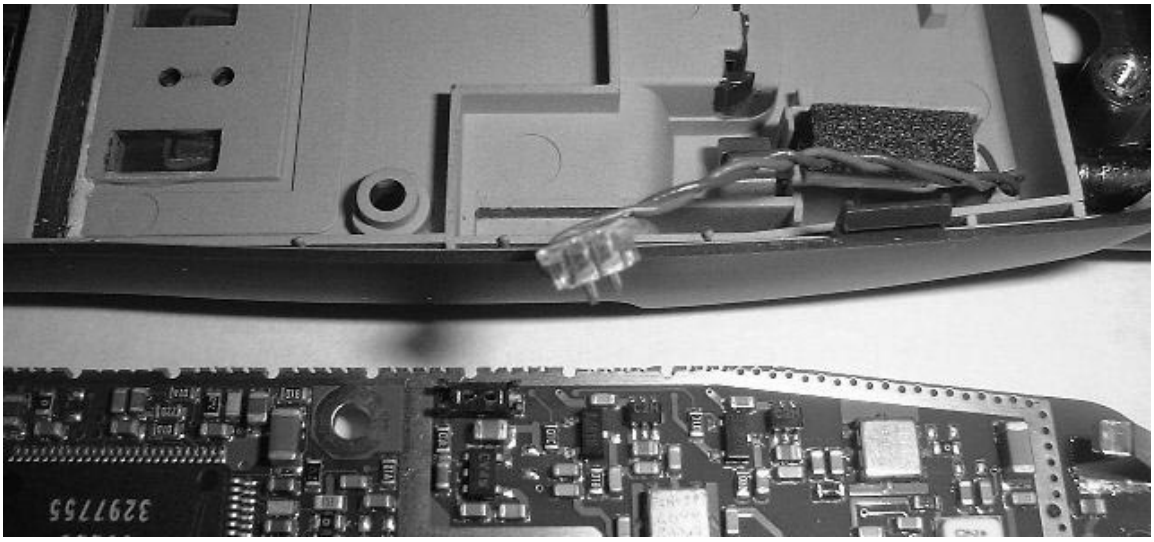
8. Take off shielding cover



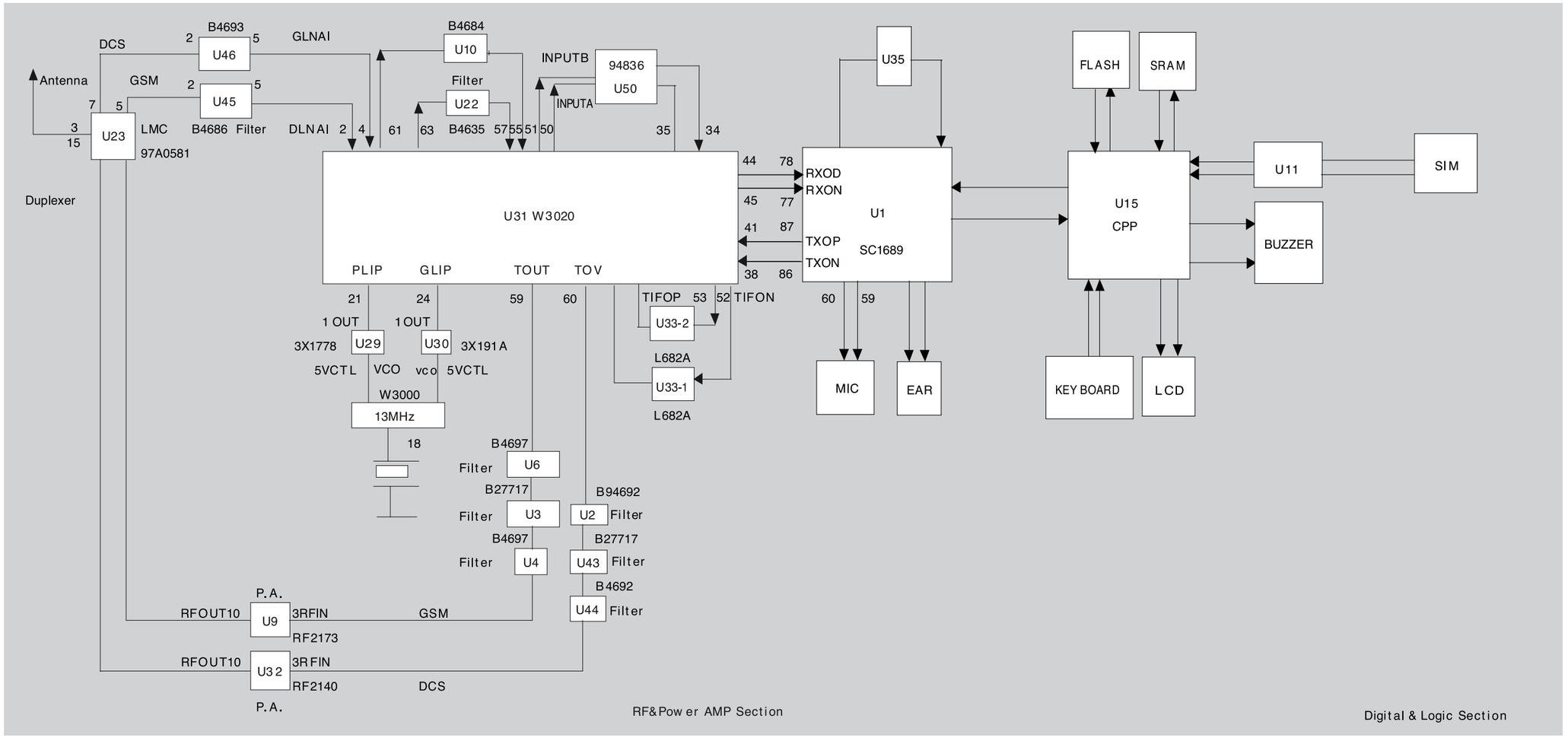
9. Take off main board



10. Disconnect the Vibrator connector

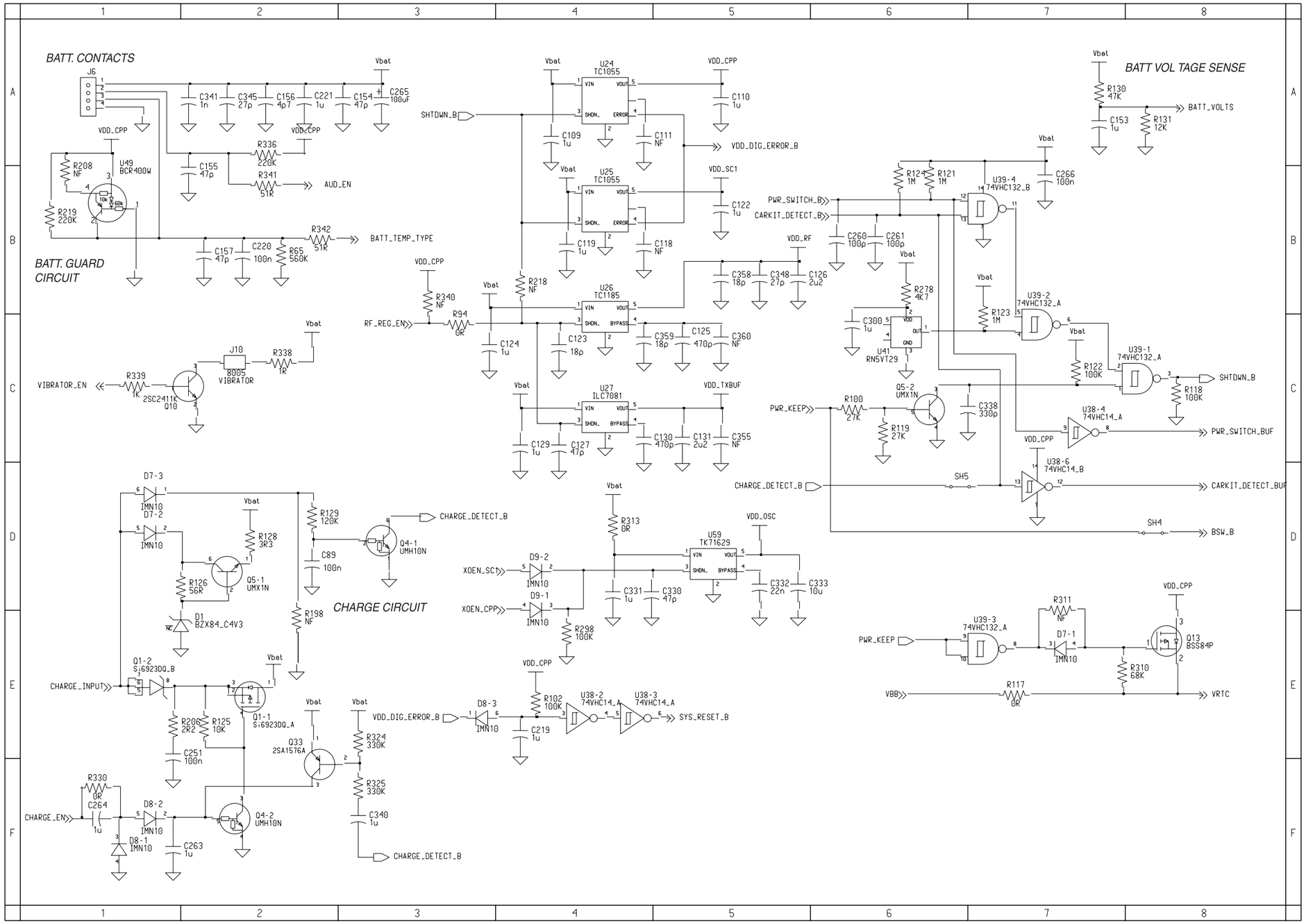


6. BLOCK DIAGRAM

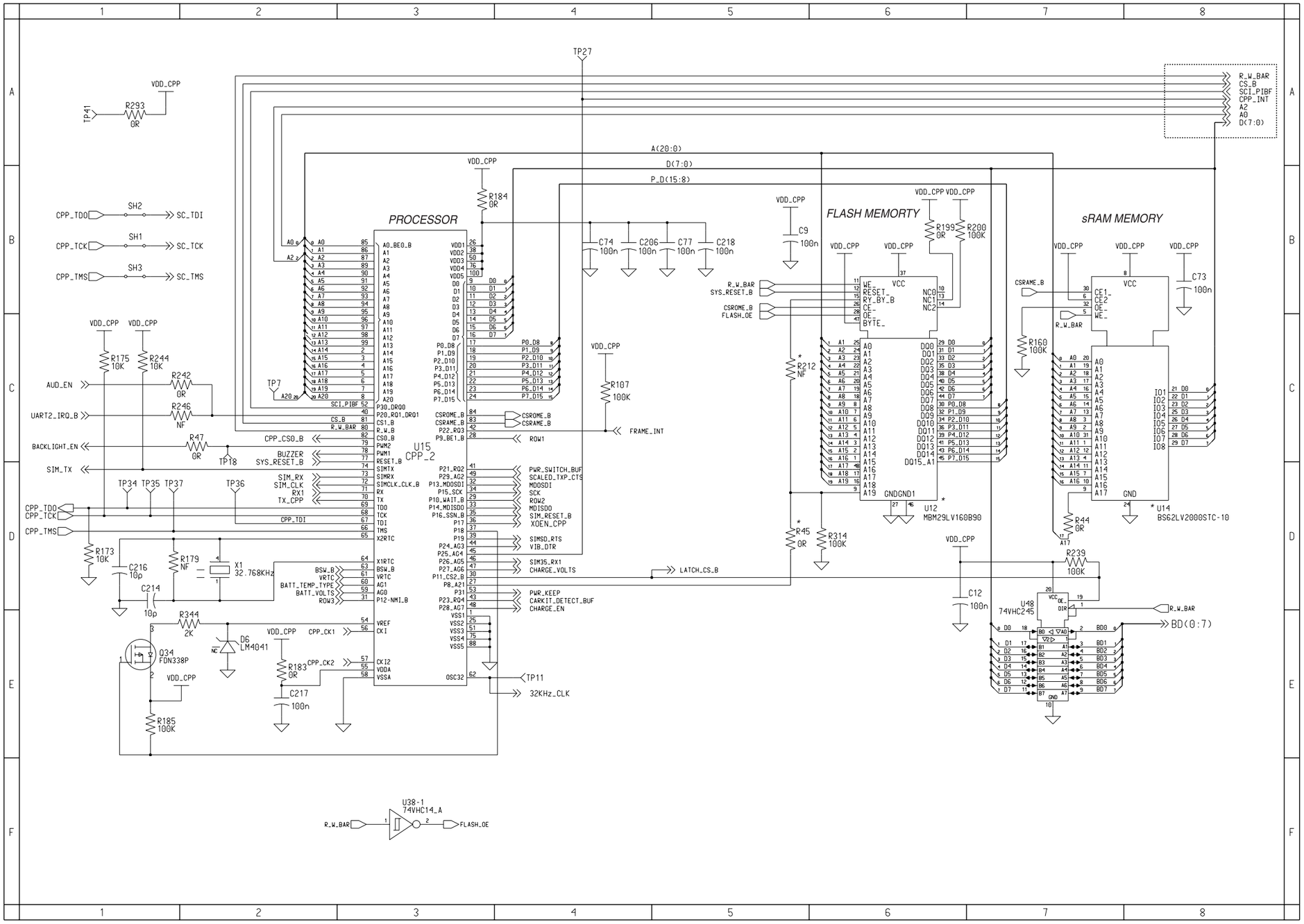


7. CIRCUIT DIAGRAM

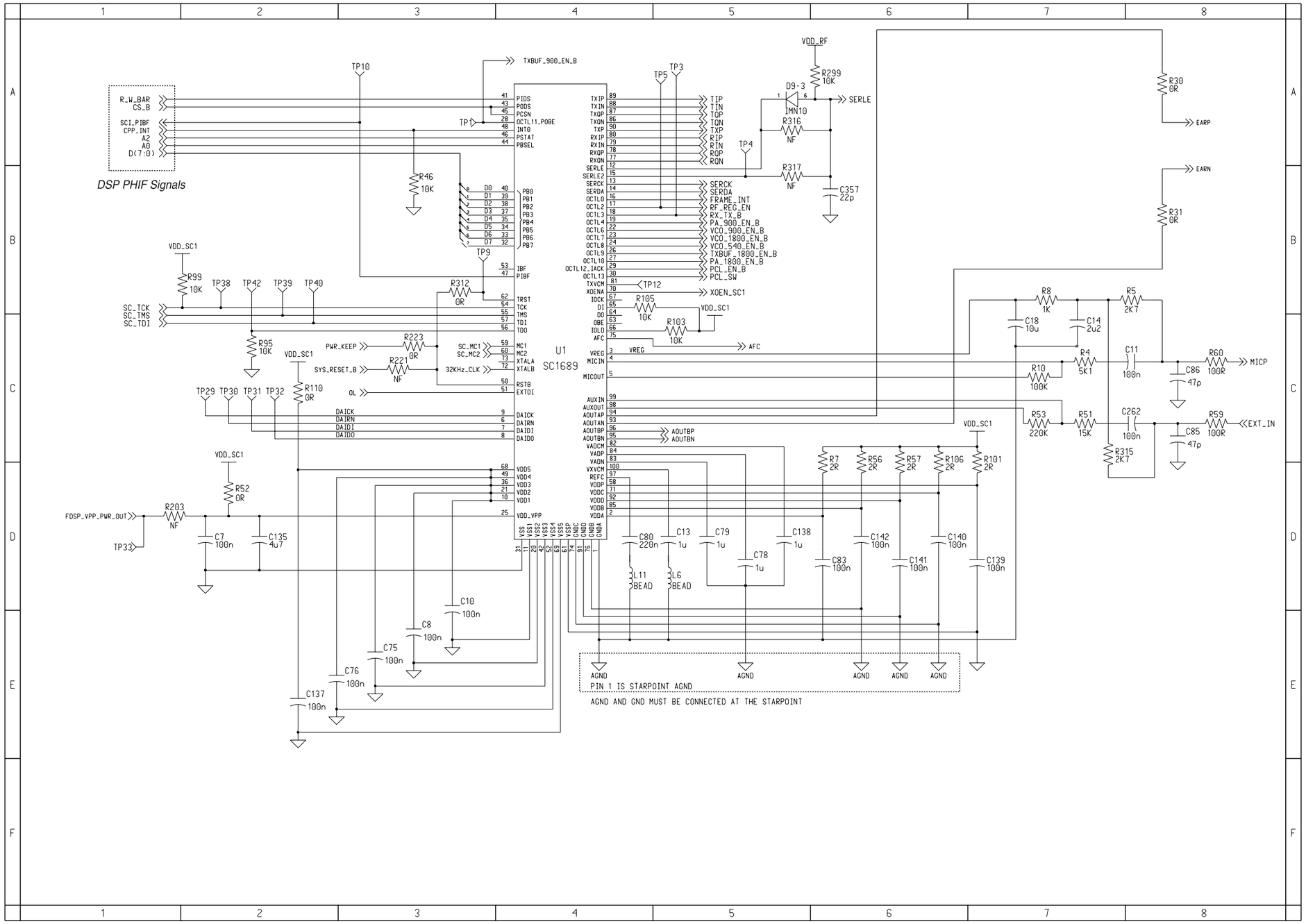
- **POWER SUPPLY**



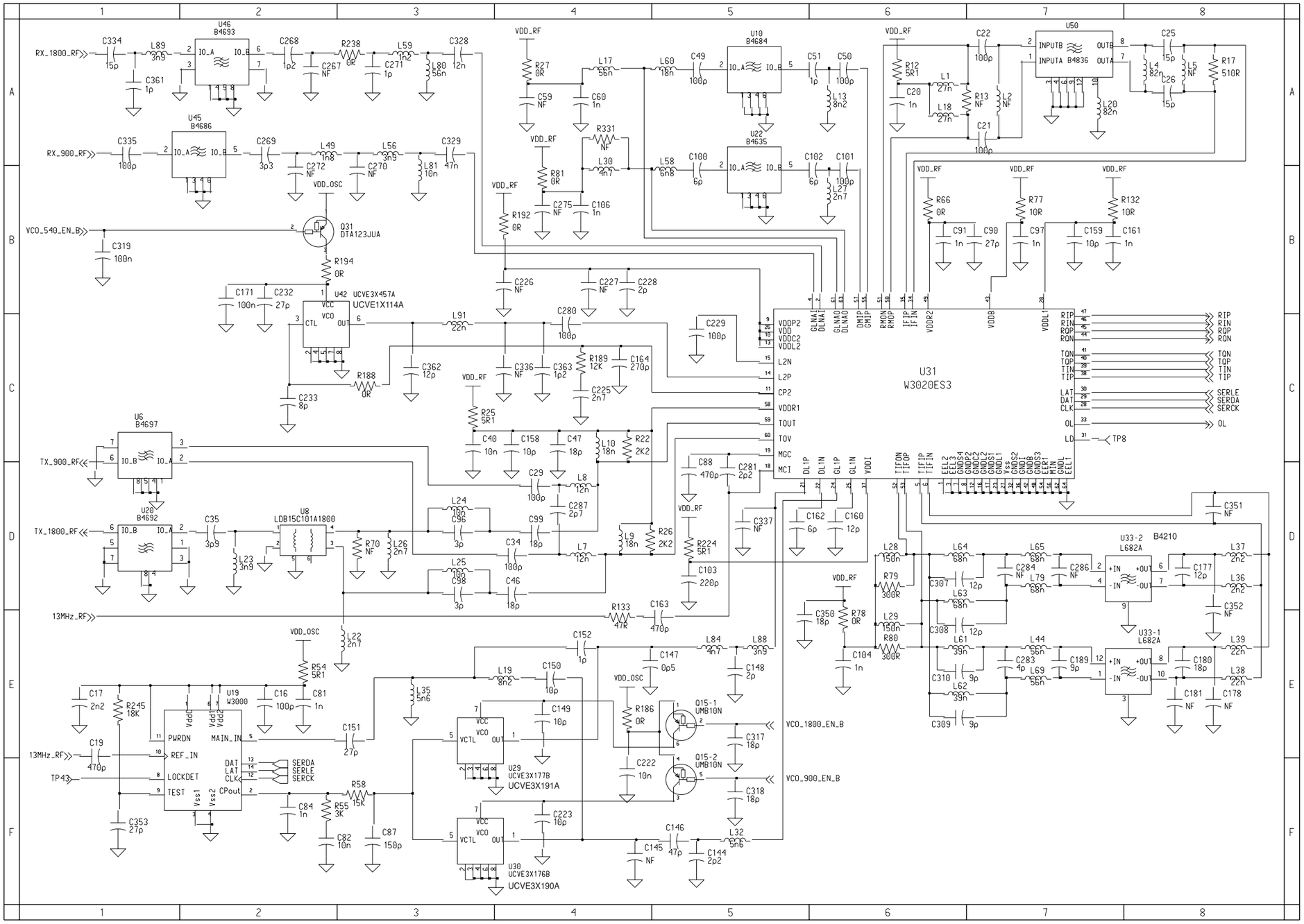
- **MCU & MEMORY**


PROCESSOR
FLASH MEMORTY
sRAM MEMORY
U15
CPP_2
U12
MBM29LV160B90
U14
BS62LV2000STC-10
U48
74VHC245
U38-1
74VHC14_A
TP27
VDD_CPP
R293
0R
TP41
R_W_BAR
CS_B
SCI_PIBF
CPP_INT
A2
A0
D(7:0)
A(20:0)
P_D(15:8)
SH2
SH1
SH3
CPP_TDO
CPP_TCK
CPP_TMS
SC_TDI
SC_TCK
SC_TMS
R184
0R
C74
C206
C77
C218
100n
C9
R199
0R
R200
100K
C73
R160
100K
R212
NF
R107
100K
FRAME_INT
R175
10K
R244
10K
R242
0R
R246
NF
R47
0R
AUD_EN
UART2_IRQ_B
BACKLIGHT_EN
SIM_TX
BUZZER
SYS_RESET_B
CPP_CSO_B
SIM_RX
SIM_CLK
TX_CPP
TP7
TP18
TP34
TP35
TP37
TP36
R173
10K
C216
10p
R179
NF
X1
32.768KHz
C214
10p
R344
2K
Q34
FDN338P
D6
LM4041
R183
0R
C217
100n
R185
100K
CPP_CK1
CPP_CK2
CPP_TDI
BSW_B
VRTC
BATT_TEMP_TYPE
BATT_VOLTS
ROW3
TP11
32KHz_CLK
R_W_BAR
SYS_RESET_B
CSROME_B
FLASH_OE
R45
0R
R314
100K
LATCH_CS_B
GND
GND1
R44
0R
R239
100K
C12
100n
BD(0:7)
P21_RQ2
P29_AG2
P13_MDOSD1
P15_SCK
P10_WAIT_B
P14_MDISDO
P16_SSN_B
P17
P18
P19
P24_AG3
P25_AG4
P26_AG5
P27_AG6
P11_CS2_B
P8_A21
P31
P23_RD4
P28_AG7
PWR_SWITCH_BUF
SCALED_TXP_CTS
MDOSDI
SCK
ROW2
MDISDO
SIM_RESET_B
XOEN_CPP
SIMSD_RTS
VIB_DTR
SIM35_RX1
CHARGE_VOLTS
PWR_KEEP
CARKIT_DETECT_BUF
CHARGE_EN
ROW1

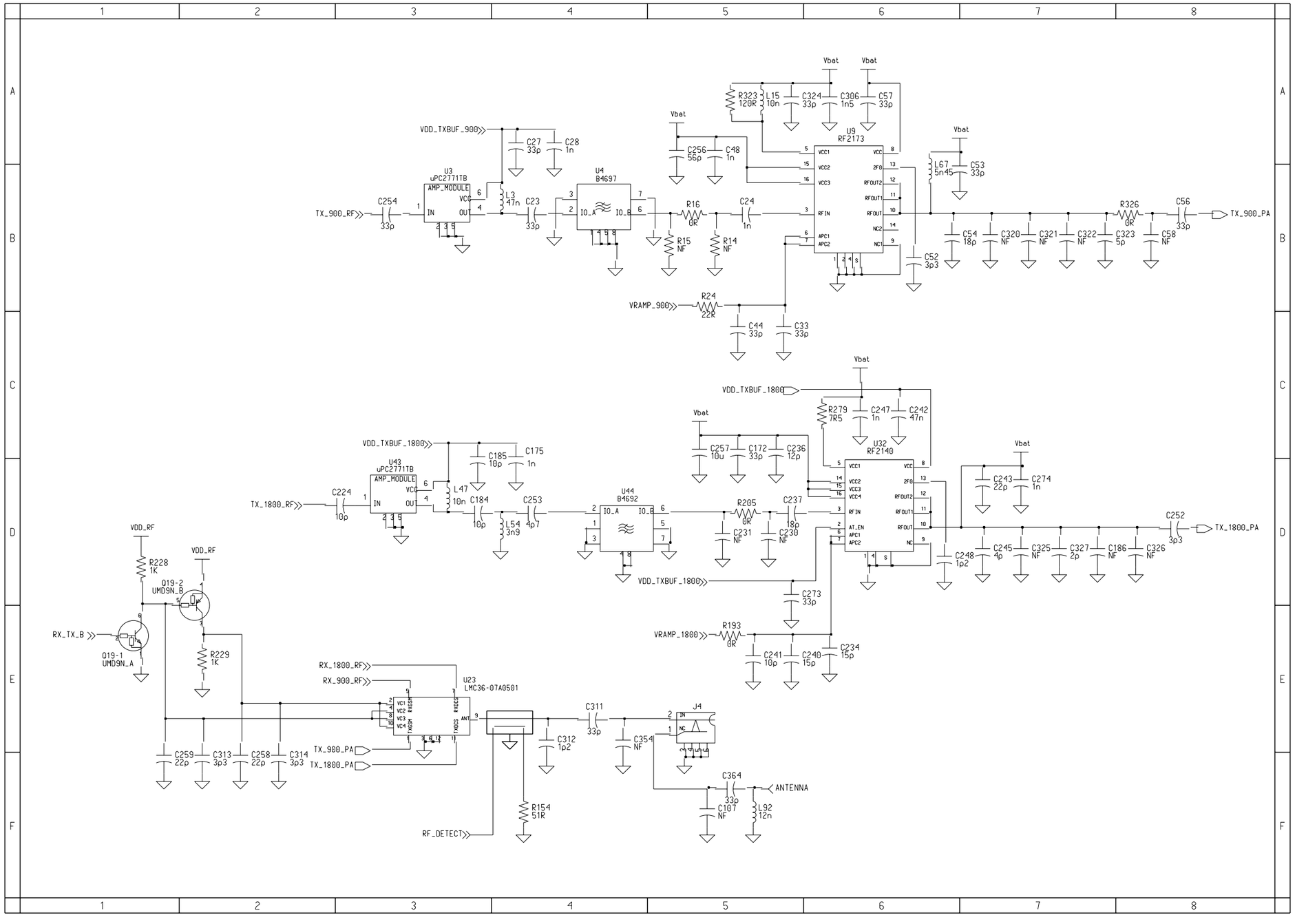
- **SCI**


DSP PHIF Signals
R_W_BAR
CS_B
SC1_PIBF
CPP_INT
A2
A0
D(7:0)
TXBUF_900_EN_B
PIDS
PODS
PCSN
OCTL11_POBE
INT0
PSTAT
PBSEL
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
IBF
PIBF
TRST
TCK
TMS
TDI
TDO
MC1
MC2
XTALA
XTALB
RSTB
EXTDI
DAICK
DAIRN
DAIDI
DAIDO
VDD5
VDD4
VDD3
VDD2
VDD1
VDD_VPP
VSS1
VSS2
VSS3
VSS4
VSS5
VSS6
GNDC
GNDD
GNDB
GNDA
TXIP
TXIN
TXQP
TXQN
TXP
RXIP
RXIN
RXQP
RXQN
SERLE
SERLE2
SERCK
SERDA
OCTL0
OCTL2
OCTL3
OCTL4
OCTL6
OCTL7
OCTL8
OCTL9
OCTL10
OCTL12_IACK
OCTL13
TXVCM
XOENA
IOCK
DI
DO
OBE
IOLD
AFC
VREG
MICIN
MICOUT
AUXIN
AUXOUT
AOUTAP
AOUTAN
AOUTBP
AOUTBN
VADCM
VADP
VADN
VXVCM
REFC
VDDP
VDDC
VDDD
VDDB
VDDA
U1
SC1689
TIP
TIN
TQP
TQN
TXP
RIP
RIN
RQP
RQN
SERCK
SERDA
FRAME_INT
RF_REG_EN
RX_TX_B
PA_900_EN_B
VCO_900_EN_B
VCO_1800_EN_B
VCO_540_EN_B
TXBUF_1800_EN_B
PA_1800_EN_B
PCL_EN_B
PCL_SW
XOEN_SC1
AFC
AOUTBP
AOUTBN
VDD_RF
VDD_SC1
SERLE
EARP
EARN
MICP
EXT_IN
FDSP_VPP_PWR_OUT
PWR_KEEP
SYS_RESET_B
32KHz_CLK
OL
SC_TCK
SC_TMS
SC_TDI
SC_MC1
SC_MC2
R99 10K
R95 10K
R223 0R
R221 NF
R110 0R
R46 10K
R312 0R
R105 10K
R103 10K
R52 0R
R203 NF
R299 10K
R316 NF
R317 NF
R30 0R
R31 0R
R8 1K
R5 2K7
R4 5K1
R10 100K
R53 220K
R51 15K
R315 2K7
R60 100R
R59 100R
R7 2R
R56 2R
R57 2R
R106 2R
R101 2R
C18 10u
C14 2u2
C11 100n
C86 47p
C262 100n
C85 47p
C357 22p
C7 100n
C135 4u7
C10 100n
C8 100n
C75 100n
C76 100n
C137 100n
C80 220n
C13 1u
C79 1u
C78 1u
C138 1u
C83 100n
C142 100n
C141 100n
C140 100n
C139 100n
L11 BEAD
L6 BEAD
D9-3 IMN10
TP1
TP3
TP4
TP5
TP9
TP10
TP12
TP29
TP30
TP31
TP32
TP33
TP38
TP39
TP40
TP42
AGND
PIN 1 IS STARPOINT AGND
AGND AND GND MUST BE CONNECTED AT THE STARPOINT

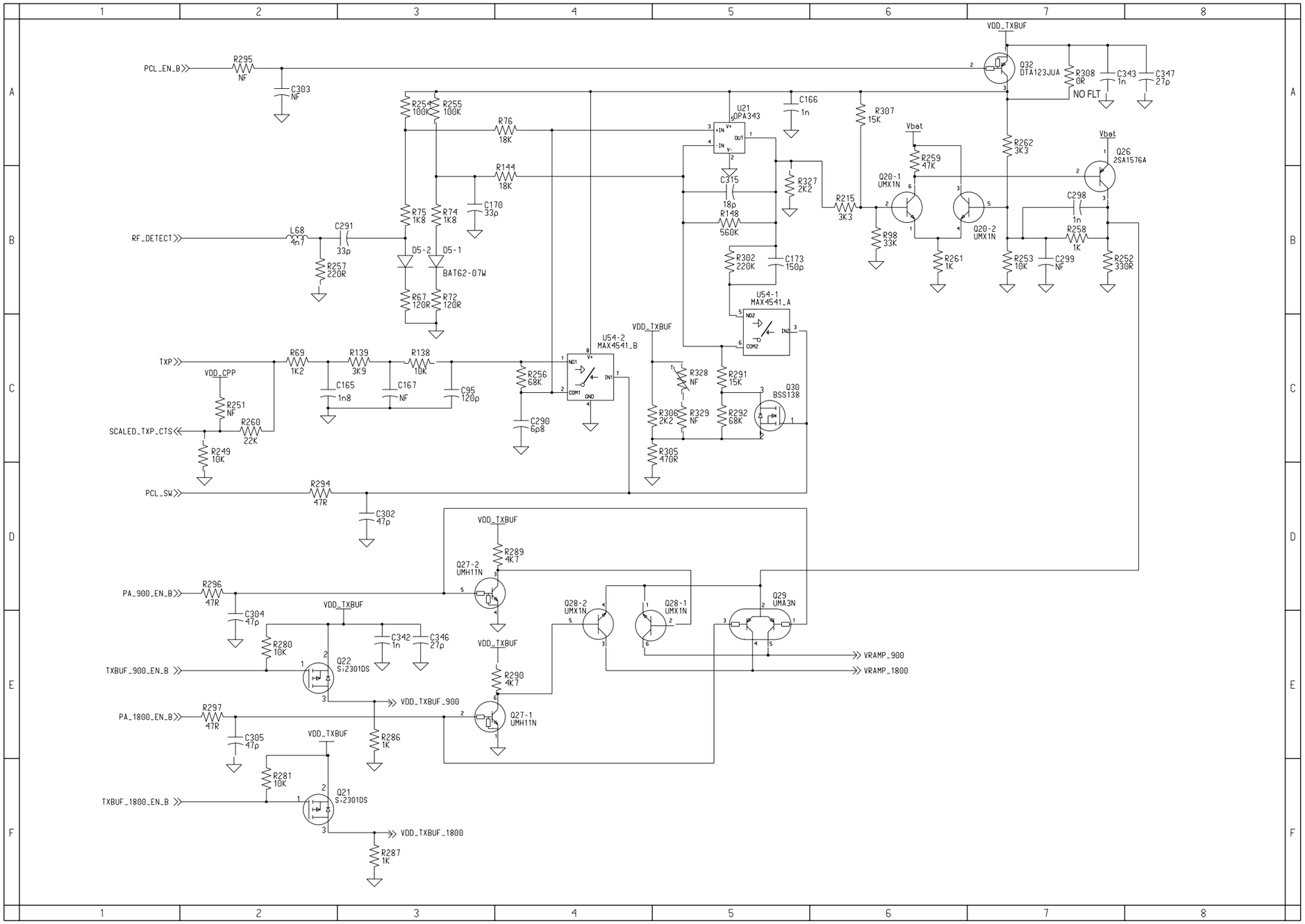
- **RF CORE**


U31
W3020ES3
U33-1 L682A
U33-2 L682A B4210
U29 UCVE3X177B UCVE3X191A
U30 UCVE3X176B UCVE3X190A
U42 UCVE3X457A UCVE1X114A
U19 W3000
Q31 DTA123JUA
Q15-1 UMB10N
Q15-2 UMB10N
VCO_1800_EN_B
VCO_900_EN_B
VCO_540_EN_B
RX_1800_RF
RX_900_RF
TX_900_RF
TX_1800_RF
13MHz_RF
TP43
TP8
SERDA
SERLE
SERCK

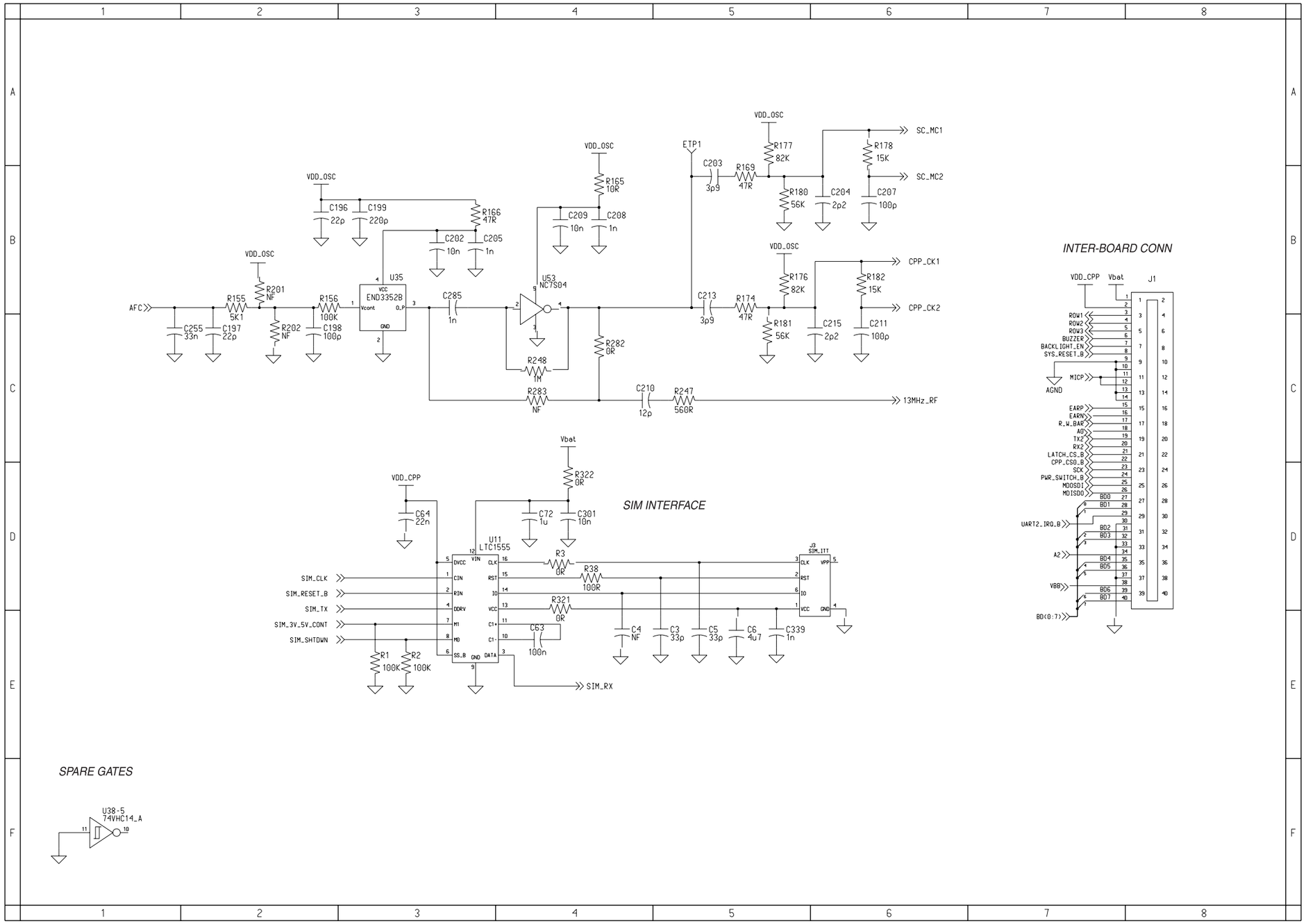
- **RF FRONT END**


Vbat
R323 120R
L15 10n
C324 33p
C306 1n5
C57 33p
U9 RF2173
VDD_TXBUF_900
C27 33p
C28 1n
C256 56p
C48 1n
L67 5n45
C53 33p
U3 uPC2771TB AMP_MODULE
U4 B4697
C254 33p
TX_900_RF
L3 47n
C23 33p
R16 0R
C24 1n
R15 NF
R14 NF
R326 0R
C56 33p
TX_900_PA
C54 18p
C320 NF
C321 NF
C322 NF
C323 5p
C58 NF
C52 3p3
R24 22R
VRAMP_900
C44 33p
C33 33p
VDD_TXBUF_1800
R279 7R5
C247 1n
C242 47n
U32 RF2140
C257 10u
C172 33p
C236 12p
C243 22p
C274 1n
U43 uPC2771TB AMP_MODULE
C185 10p
C175 1n
TX_1800_RF
C224 10p
L47 10n
C184 10p
C253
L54 3n9
4p7
U44 B4692
R205 0R
C237 18p
C231 NF
C230 NF
C252 3p3
C248 1p2
C245 4p
C325 NF
C327 2p
C186 NF
C326 NF
C273 33p
VRAMP_1800
R193 0R
C241 10p
C240 15p
C234 15p
VDD_RF
R228 1K
Q19-2 UMD9N_B
RX_TX_B
Q19-1 UMD9N_A
R229 1K
RX_1800_RF
RX_900_RF
U23 LMC36-07A0501
C259 22p
C313 3p3
C258 22p
C314 3p3
TX_900_PA
TX_1800_PA
C312 1p2
C311 33p
J4
C354 NF
C364 33p
C107 NF
L92 12n
ANTENNA
R154 51R
RF_DETECT

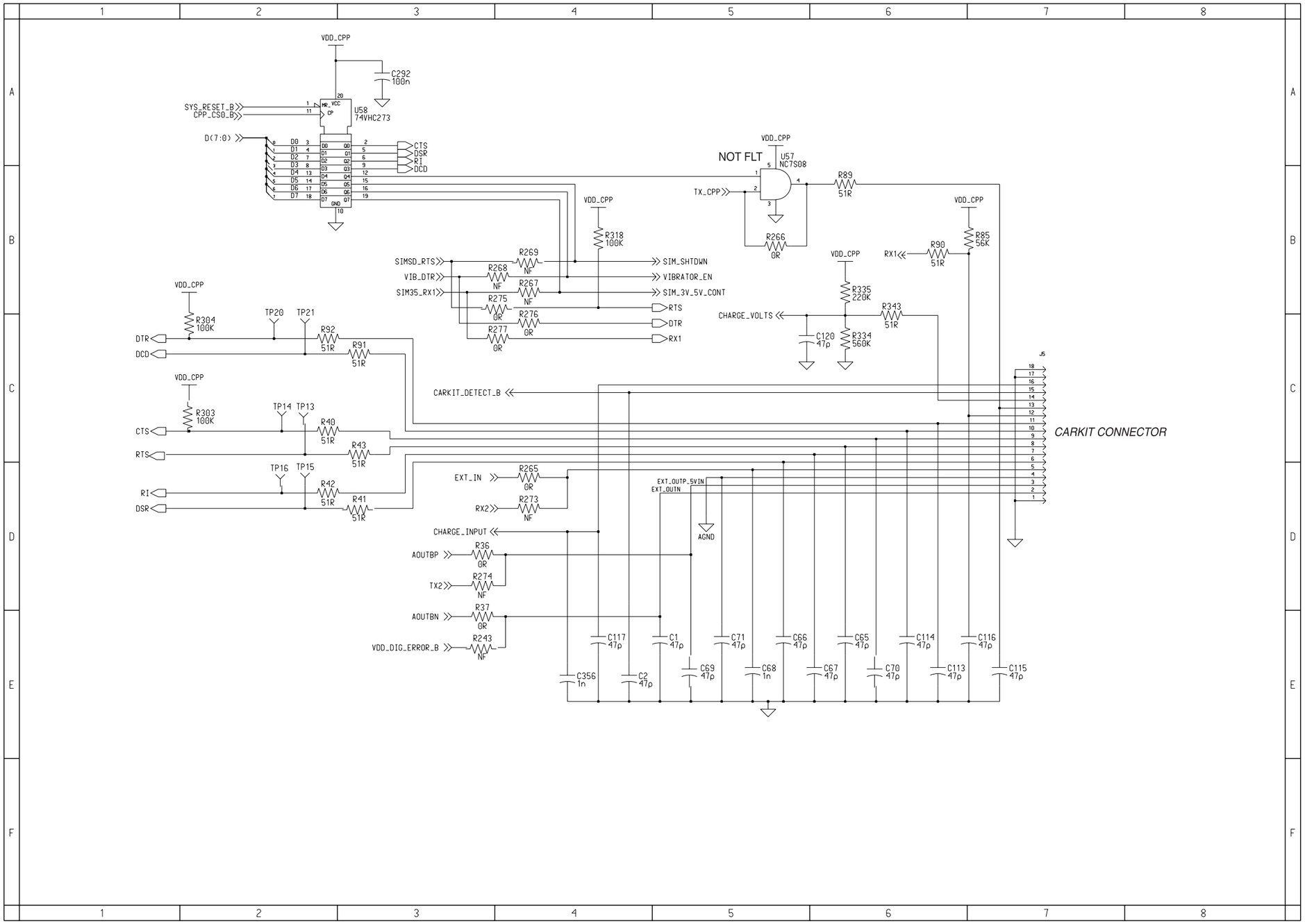
- **POWER CONTROL LOOP**



- **MISC**


VDD_OSC
AFC
R155 5K1
R201 NF
C255 33n
C197 22p
R202 NF
R156 100K
C198 100p
U35 END3352B
Vcont
VCC
O_P
GND
C285 1n
U53 NC7S04
R248 1M
R283 NF
R282 0R
C210 12p
R247 560R
13MHz_RF
C196 22p
C199 220p
R166 47R
C202 10n
C205 1n
R165 10R
C209 10n
C208 1n
ETP1
C203 3p9
R169 47R
R177 82K
R180 56K
C204 2p2
R178 15K
C207 100p
SC_MC1
SC_MC2
C213 3p9
R174 47R
R176 82K
R181 56K
C215 2p2
R182 15K
C211 100p
CPP_CK1
CPP_CK2
INTER-BOARD CONN
VDD_CPP
Vbat
J1
ROW1
ROW2
ROW3
BUZZER
BACKLIGHT_EN
SYS_RESET_B
MICP
AGND
EARP
EARN
R_W_BAR
AO
TX2
RX2
LATCH_CS_B
CPP_CS0_B
SCK
PWR_SWITCH_B
MDOSDI
MDISDO
BD0
BD1
BD2
BD3
BD4
BD5
BD6
BD7
UART2_IRQ_B
A2
VBB
BD(0:7)
SIM INTERFACE
Vbat
R322 0R
VDD_CPP
C64 22n
C72 1u
C301 10n
U11 LTC1555
VIN
DVCC
CIN
RIN
DDRV
M1
M0
SS_B
GND
DATA
CLK
RST
IO
VCC
C1+
C1-
R3 0R
R38 100R
R321 0R
C63 100n
J3 SIM_ITT
VPP
SIM_CLK
SIM_RESET_B
SIM_TX
SIM_3V_5V_CONT
SIM_SHTDWN
R1 100K
R2 100K
C4 NF
C3 33p
C5 33p
C6 4u7
C339 1n
SIM_RX
SPARE GATES
U38-5 74VHC14_A

- **CARKIT CONNECTOR**



8. HOW TO DOWNLOAD S/W

1) Select optiflash.exe from 'flash' file
2) Connect a data cable to the phone
   - Select settings in the main screen
   - Select either com port: 1 or com port: 2
   - Select (q1.50la, gsmstack.scr) in 'flash & verify: browse
   - Generic
   - USE EXTERNAL
   - Choose FLASH, FLASH.SCR
   - Select 'OK'
   - The indicator 'FLASH' appears on the main screen
   - After the 'POWER ON "11111111" block" indicator is shown on the screen, the battery can be installed.
   - After the 'ALL IS WELL' indicator is displayed, the battery can be uninstalled.
   - To confirm S/W, press 'PHONE * 789#+SEND'
   - Wait for 5seconds after 'PLEASE WAIT' indicator is displayed on the screen.
   - Select 'Field Test' by pressing UP/DOWN button.
   - Confirm 's/w version' of 5th menu.

9. HOW TO PROCESS CALIBRATION

9-1. Equipment Lists

Equipment for Calibration	Type / Model	Brand
Wireless Communication Test Set	HP-8960	Hewlett Packard
RS232 Connector (for Software Installation)		LG
RF Cable		LG
Power Supply	HP-66311B	Hewlett Packard
GBIP interface card	HP-GBIP	Hewlett Packard
Test SIM Card	ORGA	Hewlett Packard
Calibration & Final test software		LG
PC (for Software Installation)	Pentium II class above 300Mhz	Service Center

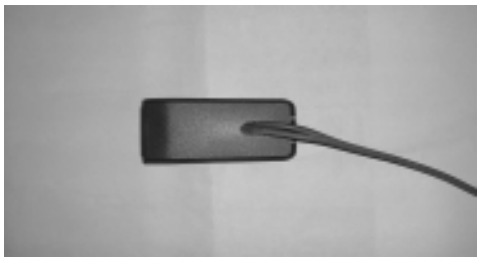
9-2. Equipment Features

1. Communication test set HP8960

2. DC Power Supply HP66311B

3. RS-232 CABLE

4. Battery Simulator



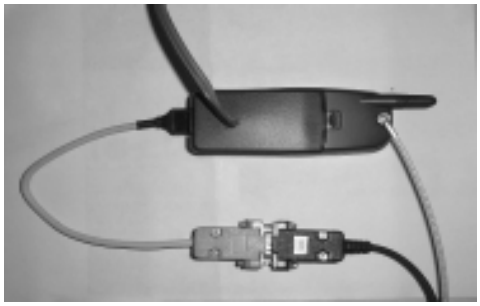
5. RF CABLE

6. Test SIM card

7. PC(Regular)

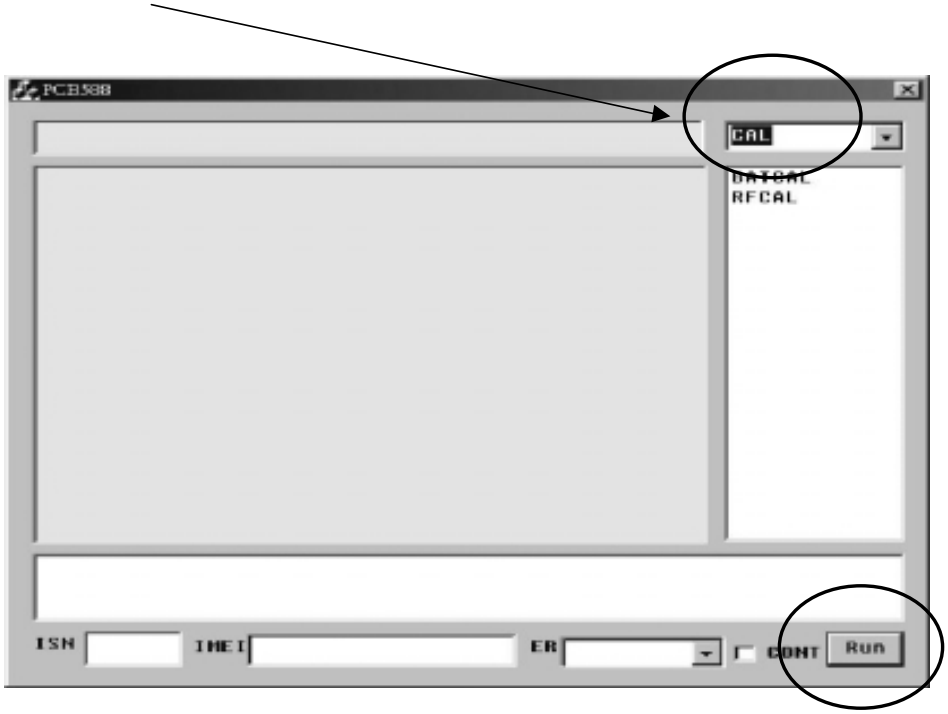
9-3. Procedure

1. Insert Test SIM card in LG200 handset
2. Install Battery simulator on handset
3. Connect RS-232 Cable to connector on handset
4. Connect RF Cable to LG-200 handse's RF Connector

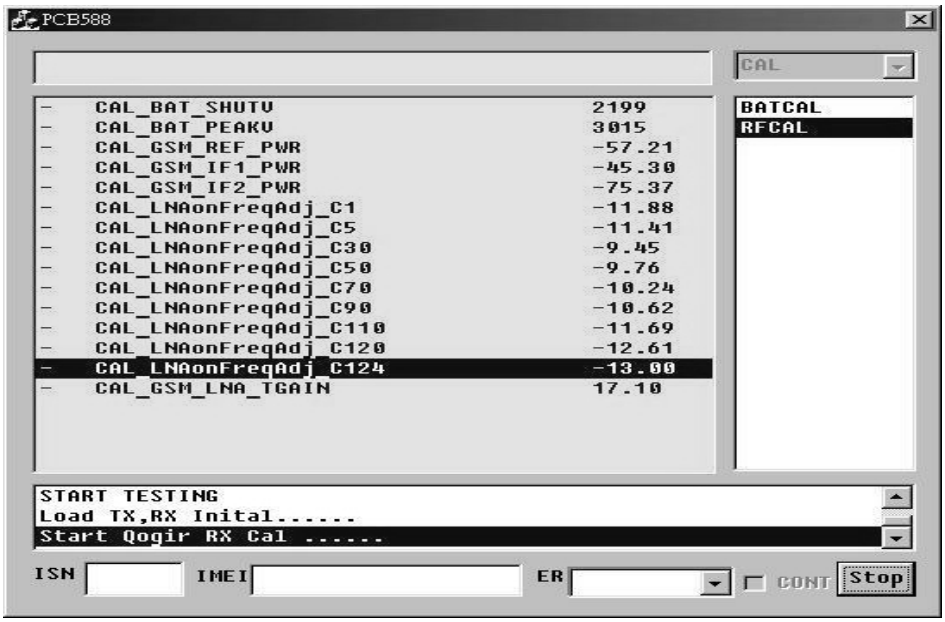


5. POWER ON PC then enter into WINDOWS NT. (Remark: Windows 95, 98, 2000 system could be feasible, but we strongly recommend using Windows NT system due to stability reason)
6. Run **PCB588 exe**, then **PC588** application window is appeared as shown below.

7. Select **CAL** item.



8. Select **RUN** Icon, start the Calibration process.

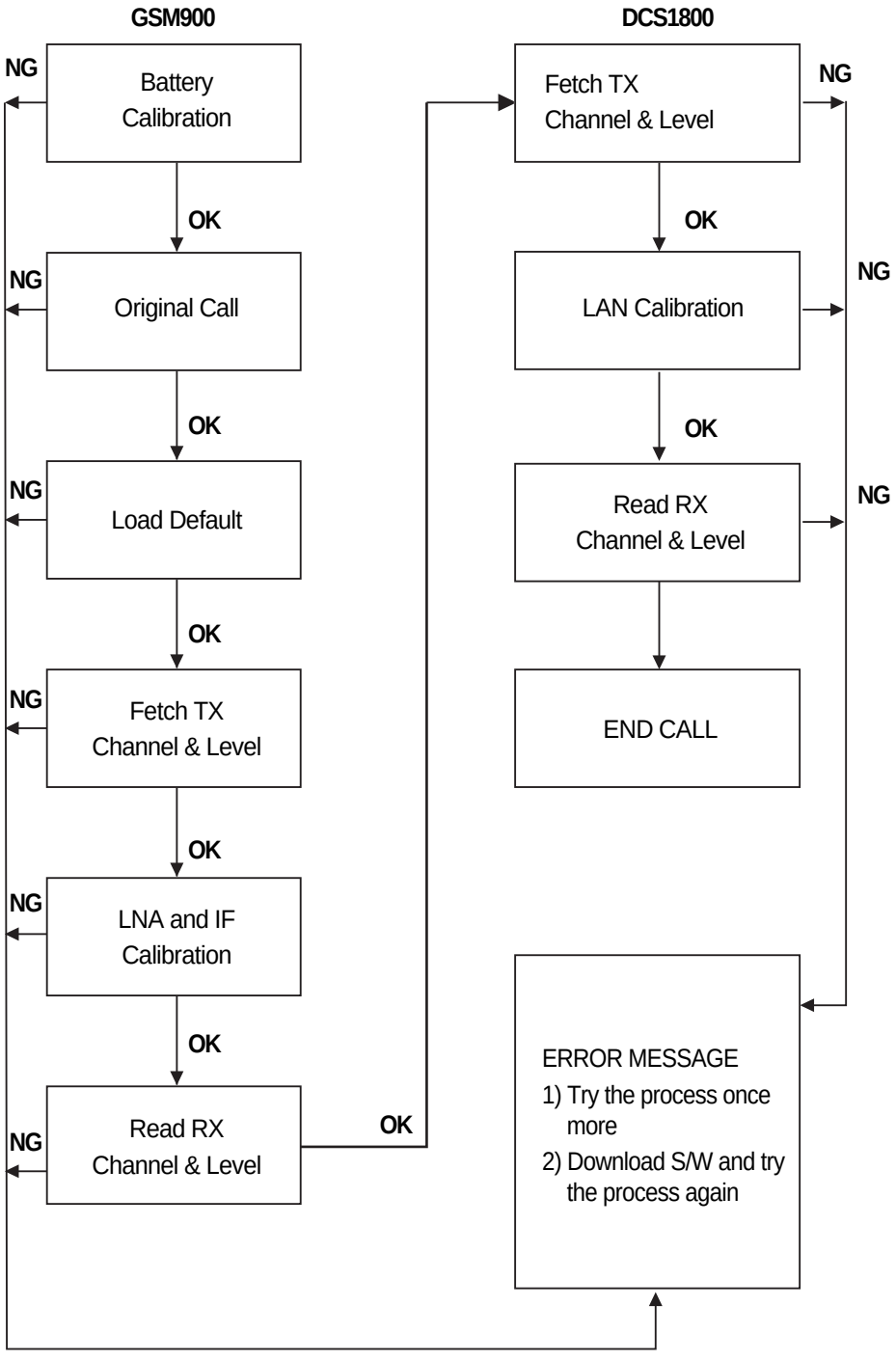


(Processing Screen)

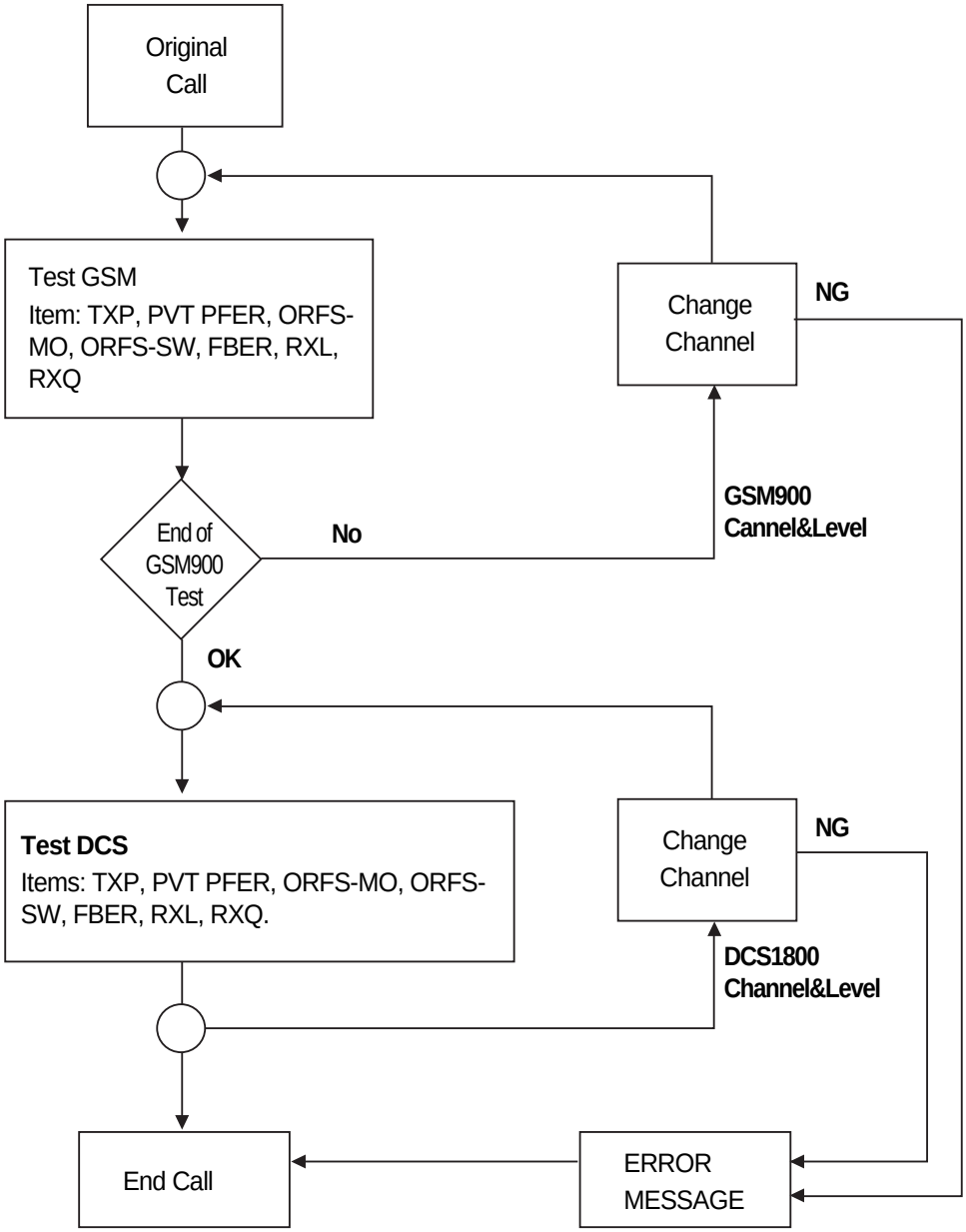
9. The program will be stopped automatically when process finish.

(Finished Screen)

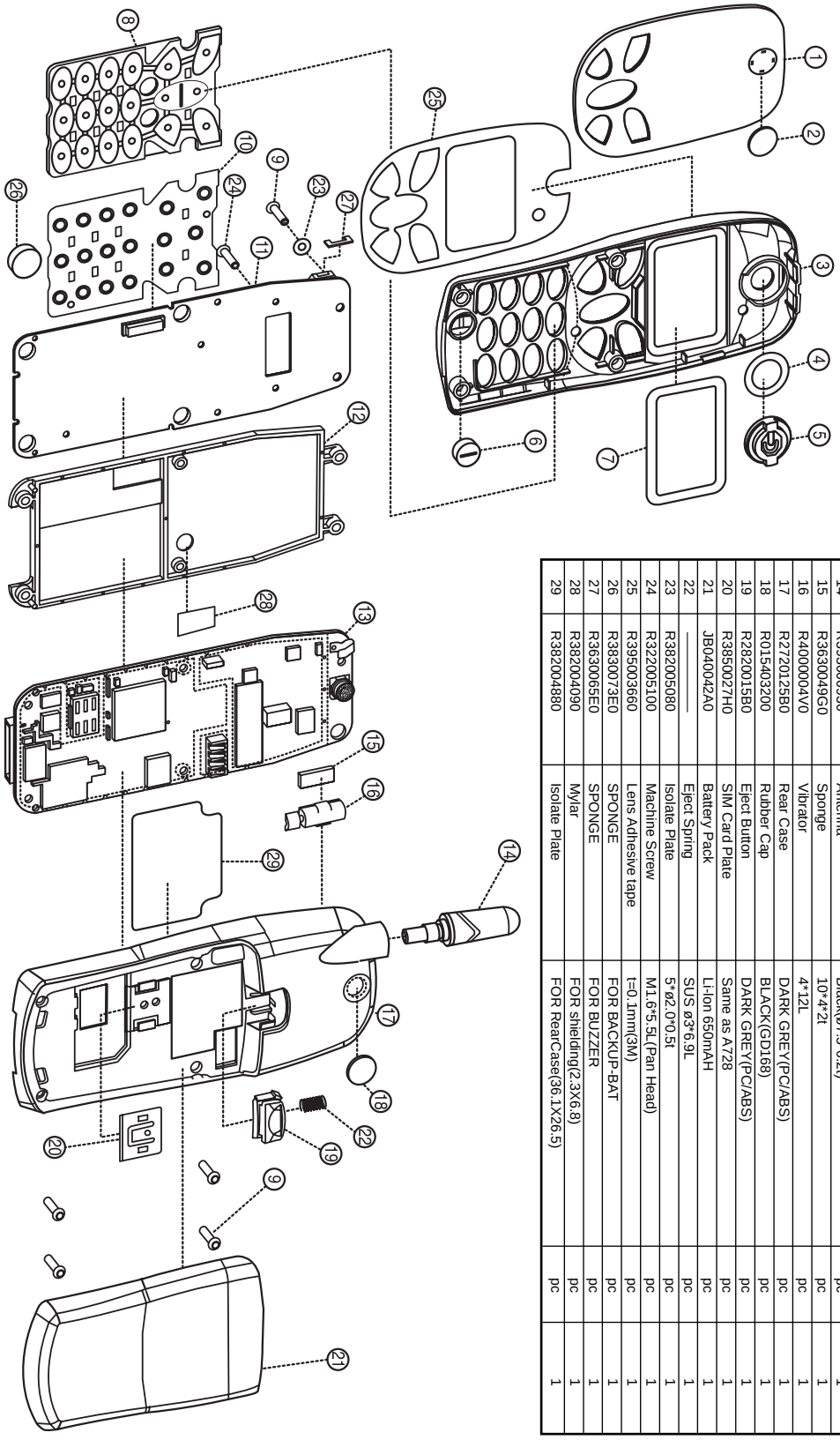
9-4. GSM900/DCS1800 Calibration Test Flowchart



9-5. GSM900/DCS1800 Final Test Flowchart



10. EXPLODED VIEW



NO.	PART NO	PARTNAME	DESCRIPTION	UNIT	QUANTITY
1	R387006BA0	LCD Lens	In-Mold	pc	1
2	R397000C0	Nonwoven Receiver	Black(ø7.5*0.2t)	pc	1
3	R271015DB0	Front Case	Pearl white	pc	1
4	R3630029E0	Sponge	ø13* ø9*0.5t (Receiver)	pc	1
5	HJ001171C0	Receiver	SD0311B-2 ø13 32ohm	pc	1
6	HJ110029M0	Microphone	OBC 18543-C10-C33-3mm BOSUNG	pc	1
7	R3630069E0	Sponge	38*31*0.5t (LCM)	pc	1
8	R392002430	Keypad	Plastic+Rubber(Silver/White)	pc	1
9	R322002600	Machine Screw	M2*8L(Pan Head)	pc	5
10	R401000ZU0	Metal Dome	4	pc	1
11	KG101401A0	Keypad PCB	A758(T=0.8 ± 0.08)	pc	1
12	R286002D30	Shielding Cover	Same as A72B	pc	1
13	KG101500A0	Main Board	A758(T=1.22 ± 0.12)	pc	1
14	R393000930	Antenna	Black(ø7.5*0.2t)	pc	1
15	R3630049G0	Sponge	10*4*2t	pc	1
16	R4000004V0	Vibrator	4*12L	pc	1
17	R2720125B0	Rear Case	DARK GREY(PC/ABS)	pc	1
18	R015403200	Rubber Cap	BLACK(GD168)	pc	1
19	R282001SB0	Eject Button	DARK GREY(PC/ABS)	pc	1
20	R3850027H0	SIM Card Plate	Same as A728	pc	1
21	JB040042A0	Battery Pack	Li-Ion 650mAH	pc	1
22	———	Eject Spring	SUS ø3*6.9L	pc	1
23	R382005080	Isolate Plate	5*ø2.0*0.5t	pc	1
24	R322005100	Machine Screw	M1.6*5.5L(Pan Head)	pc	1
25	R395003660	Lens Adhesive tape	t=0.1mm(3M)	pc	1
26	R3830073E0	SPONGE	FOR BACKUP-BAT	pc	1
27	R3630065E0	SPONGE	FOR BUZZER	pc	1
28	R382004090	Mylar	FOR shielding(2.3X6.8)	pc	1
29	R382004880	Isolate Plate	FOR RearCase(36.1X26.5)	pc	1

11. REPLACEMENT PARTS LIST

1) Main Board

LTEM	PART NO.	LOCATION	SPECIFICATION	REMARK
1	GM447052J0	C1,C2,C65,C66,C67,C69,C70,C71,C85,C86,C113, C114,C115,C116,C117,C120,C127,C146,C154,C155, C157,C302,C304,C305,C330	CHIP MONO 1608 47P/50V JN MURATA	
2	GM433052J0	C3,C5,C23,C27,C33,C44,C53,C56,C57,C170,C172, C254,C273,C291,C311,C324,C364	CHIP MONO 1608 33P/50V JN MURATA	
3	GM04751870	C6,C135	CHIP MONO 2012 4.7U/10V ZY TATYO YUDEN	
4	GM410423J0	C7,C8,C9,C10,C11,C12,C63,C73,C74,C75,C76,C77, C83,C89,C137,C139,C140,C141,C142,C171,C206, C217,C218,C220,C251,C262,C266,C292,C319,	CHIP MONO 1608 0.1U/16V KX MURATA	
5	GM410518J0	C13,C109,C110,C119,C122,C124,C129,C138,C153, C219,C221,C263,C264,C300,C331,C340	CHIP MONO 1608 1U/10V ZY MURATA	
6	GM02251370	C14,C126,C131	CHIP MONO 2012 2.2U/10V KX TAIYO YUDEN	
7	GM410152J0	C16,C21,C22,C29,C34,C49,C50,C101,C198,C207, C211,C229,C260,C261,C280,C335	CHIP MONO 1608 100P/50V JN MURATA	
8	GM422253J0	C17	CHIP MONO 1608 2200P/50V KX MURATA	
9	GM11060KJ0	C18,C333	CHIP MONO 3216 10U/6.3V K/X5RMURATA	
10	GM447152J0	C19,C88,C125,C130,C163	CHIP MONO 1608 470P/50V JN MURATA	
11	GM910232J0	C20,C24,C28,C48,C60,C68,C81,C84,C91,C97,C104, C106,C161,C166,C175,C205,C208,C247,C274,C285, C339,C341,C342,C343,C356,C298	CHIP MONO 1608 0.001U/25V J/COH MURATA	
12	GM415052J0	C25,C26,C234,C240,C334	CHIP MONO 1608 15P/50V JNMURATA	
13	GM43995BJ0	C35,C203,C213	CHIP MONO 1608 3.9P/50V CNMURATA	
14	GM410353J0	C40,C202,C209,C222,C301	CHIP MONO 1608 0.01U/50V KX MURATA	
15	GM41805270	C46,C47,C99,C23,C180,C237,C315,C317,C318, C350,C358,C359	CHIP MONO 1608 18P/50V JNTAIYO YUDEN	
16	GM40105BJ0	C51,C152,C271,C361	CHIP MONO 1608 1P/50V CNMURATA	
17	GM43395BJ0	C52,C252,C269,C313,C314	CHIP MONO 1608 3.3P/50V CNMURATA	
18	GM418052J0	C54	CHIP MONO 1608 18P/50V JNMURATA	
19	GM922333J0	C64,C332	CHIP MONO1608 .022U/25V KX MURATA	
20	GM422428J0	C80	CHIP MONO 1608 0.22U/16V ZYMURATA	
21	GM11033MJ0	C82	CHIP MONO 3216 0.01U/25V J/COHMURATA	
22	GM415152J0	C87,C173	CHIP MONO 1608 150P/50V JN MURATA	
23	GM427052J0	C90,C151,C232,C345,C346,C347,C348,C353	CHIP MONO 1608 27P/50V JNMURATA	
24	GM412152J0	C95	CHIP MONO 1608 120P/50V JNMURATA	
25	GM40305BJ0	C96,C98	CHIP MONO 1608 2P/50V CNA	
26	GM40605CJ0	C100,C102,C162	CHIP MONO 1608 6P/50V DN MURATA	
27	GM422152J0	C103,C199	CHIP MONO 1608 220P/50V JN MURATA	
28	GM42295BJ0	C144,C204,C215,C281	CHIP MONO 1608 2.2P/50V CN MURATA	
29	GM40595BJ0	C147	CHIP MONO 1608 0.5P/50V CNMURATA	
30	GM40205BJ0	C148,C228,C327	CHIP MONO 1608 2P/50V CNMURATA	
31	GM41005CJ0	C149,C150,C158,C159,C184,C185,C223,C224,C241	CHIP MONO 1608 10P/50V DNMURATA	
32	GM44795BJ0	C156,C253	CHIP MONO 1608 4.7P/50V CN MUR ATA	
33	GM412052J0	C160,C177,C210,C236,C307,C308,C362	CHIP MONO 1608 12P/50V JNMURATA	
34	GM427152J0	C164	CHIP MONO 1608 270P/50V JNMURATA	
35	GM418253J0	C165	CHIP MONO 1608 1800P/50V KXMURATA	
36	GM40905CJ0	C189,C309,C310	CHIP MONO 1608 9P/50V DN MURATA	

LTEM	PART NO.	LOCATION	SPECIFICATION	REMARK
37	GM422052J0	C196,C197,C243,C258,C259,C357	CHIP MONO 1608 22P/50V JNMURATA	
38	GM410052J0	C214,C216	CHIP MONO 1608 10P/50V JN MURATA	
39	GM127252J0	C225	CHIP MONO 3216 0.0027U/50V JNCOG MURATA	
40	GM40805BJ0	C233	CHIP MONO 1608 8P/50V CNMURATA	
41	GM447333J0	C242,C329	CHIP MONO 1608 0.047U/25V KX MURATA	
42	GM40405BJ0	C245,C283	CHIP MONO 1608 4P/50V CNMURATA	
43	GM41295BJ0	C248,C268,C312,C363	CHIP MONO 1608 1.2P/50V CN MURATA	
44	GM433323J0	C255	CHIP MONO 1608 0.033U/16V KXMURATA	
45	GM456052J0	C256	CHIP MONO 1608 56P/50V JN MURATA	
46	GM11061870	C257	CHIP MONO 3216 10U/10V ZY TAIYOYUDEN	
47	GN410725E0	C265	CHIP TAN D 100U/16V M AVXKYOCERA	
48	GM42795BJ0	C287	CHIP MONO 1608 2.7P/50V CNMURATA	
49	GM46895BJ0	C290	CHIP MONO 1608 6.8P/50V CN MURATA	
50	GM415253J0	C306	CHIP MONO 1608 1500P/50V KXMURATA	
51	GM40505BJ0	C323	CHIP MONO 1608 5P/50V CN MURATA	
52	GM447253J0	C328	CHIP MONO 1608 .0047U/50V K MURATA	
53	GM433152J0	C338	CHIP MONO 1608 330P/50V JN MURATA	
54	EJ13008620	D1	DIODE BZX84-C4V3 SOT23 3P PHILIPS	
55	EJ15003160	D5	DIODE SMS7630-020 SOT-143 4P ALPHA	
56	EK920095W0	D6	ZEN DIODE LM4041CIM3-1.2 SOT23NATIONAL	
57	EJ15001240	D7,D8,D9	DIODE IMN10 SMD 6P ROHM	
58	R301007060	J1	CONNECTOR DF12D(3.0)-40DP-0.5V(81) HIROSE	
59	R3270005I0	J3	SIMLOCK 11.7x7.5x2.0mm	
60	JC101008Y0	J4	ANT-SW IMS 2104.99 IMS	
61	R3010064M0	J5	CARKIT HO1453G1 16P GD588	
62	R3010181F0	J6	BAT.CON.AB3043-A0G1K 4Pin	
63	R3010166M0	J10	VIBRATOR CONNECTOR 1.27mm PITCH 2 PIN SMT	
64	HD000019S0	L1,L18	CORE SMT 27nH 0603 5% KOA	
65	HD000020S0	L3	CORE SMT 47nH 0603 5% KOA	
66	HD000033S0	L4,L80	CORE SMT 82nH 0603 5% KOA	
67	HC10403070	L6,L11	CHIP BEAD 1608 60ohm (PANASONIC)	
68	HD000029S0	L7,L8,L92	CORE SMT 12nH 0603 5% KOA	
69	HD000030S0	L9,L10,L60	CORE SMT 18nH 0603 5% KOA	
70	HD000022S0	L13,L19	CORE SMT 8.2nH 0603 5% KOA	
71	HD000028S0	L15,L24,L25,L47,L81	CORE SMT 10nH 0603 5% KOA	
72	HD000032S0	L17,L44,L69	CORE SMT 56nH 0603 5% KOA	
73	HB100145E0	L20	COIL SMT 82nH 0603 5% COILCRAFT	
74	HD000042S0	L22,L26,L27	CORE SMT 2.7nH 0603 ±0.3nHKOA	
75	HD000024S0	L23,L56,L54,L88,L89	CORE SMT 3.9nH 0603 ±0.3nH KOA	
76	HD000043S0	L28,L29	CORE SMT 150nH 0603 5% KOA	
77	HD000026S0	L30,L84,L68	CORE SMT 4.7nH 0603 ±0.3nH KOA	
78	HD000027S0	L32,L35	CORE SMT 5.6nH 0603 ±0.3nHKOA	
79	HD000041S0	L36,L37	CORE SMT 2.2nH 0603 ±0.3nHKOA	
80	HD000018S0	L38,L39,L91	CORE SMT 22nH 0603 5% KOA	
81	HD000040S0	L49	CORE SMT 1.8nH 0603 ±0.3nHKOA	
82	HD000016S0	L58	CORE SMT 6.8nH 0603 5% KOA	
83	HD000044S0	L59	CORE SMT 1.2nH 0603 ±0.3nHKOA	
84	HD000031S0	L61,L62	CORE SMT 39nH 0603 5% KOA	

LTEM	PART NO.	LOCATION	SPECIFICATION	REMARK
85	HD000021S0	L63,L64,L65,L79	CORE SMT 68nH 0603 5% KOA	
86	HB100142E0	L67	COIL SMT 5.45nH 0906 5% COILCRAFT	
87	EG950001T0	Q1	MOSFET-P-SCH SI6923DQ TSSOP 8PVISHAY	
88	EA95853040	Q4	TR NPN UMH10N SC-88 6P ROHM	
89	EA95000440	Q5,Q20,Q28	TR NPN UMX1N UM6 6P ROHM	
90	EA95000740	Q10	TR NPN 2SC2411K SMT 3P ROHM	
91	EG92000430	Q13	MOSFET-P BSS84P SOT-23 3P SIEMENS	
92	EB95000840	Q15	TR PNP UMB1ON SC-88 6P ROHM	
93	EA95001340	Q19	TR NPN/PNP UMD9N SC-88 6P ROHM	
94	EG920005T0	Q21,Q22	MOSFET-P Si2301DS SOT23 3P VI SHAY	
95	EB95000740	Q26,Q33	TR PNP 2SA1576A UMT3 3P ROHM	
96	EA95001240	Q27	TR NPN UMH11N SC-88 6P ROHM	
97	EB95000940	Q29	TR PNP UMA3N SC-88A 5P ROHM	
98	EF92000130	Q30	MOSFET-N BSS138 SOT23 3P SIEMENS	
99	EB95001040	Q31	TR PNP DTA123JUA SC-70 3P ROHM	
100	EG920011A0	Q34	FET P FDN338P SOT-23 FAIRCHILD	
101	FN01100300	R1,R2,R10,R102,R107,R118,R122,R156,R160,R185, R200,R239,R254,R255,R298,R303, R304,R314,R318	CHIP RES 1/10W 1% 100K 1608	
102	FM01000000	R3,R16,R27,R30,R31,R36, R37,R44,R45,R47,R52, R66,R78,R81,R94, R110,R117,R183,R184,R186,R188, R192,R193,R194,R199,R205,R223,R238,R242,R265, R266, R275,R276,R277,R282,R293,R308,R312,R313, R321,R322,R326,R330	CHIP RES 1/10W 5% 0ohm 1608	
103	FN01510100	R4,R155	CHIP RES 1/10W 1% 5.1Kohm 1608	
104	FN01270100	R5	CHIP RES 1/10W 1% 2.7K 1608	
105	FM01002000	R7,R56,R57,R101, R106	CHIP RES 1/10W 5% 2ohm 1608	
106	FN01100100	R8,R228,R229,R286,R287,R258,R261,R339	CHIP RES 1/10W 1% 1K 1608	
107	FM01051900	R12,R25,R54,R224	CHIP RES 1/10W 5% 5.1ohm 1608	
108	FN01510000	R17	CHIP RES 1/10W 1% 510ohm 1608	
109	FN01220100	R22,R26,R306,R327	CHIP RES 1/10W 1% 2.2K 1608	
110	FN01022000	R24	CHIP RES 1/10W 1% 22ohm 1608	
111	FN01100000	R38,R59,R60	CHIP RES 1/10W 1% 100ohm 1608	
112	FN01051000	R40,R41,R42,R43,R89,R90,R91,R92,R154,R341, R342,R343	CHIP RES 1/10W 1% 51ohm 1608	
113	FN01100200	R46,R95,R99,R103,R105,R125,R138,R173,R175, R212,R244,R249,R253,R280,R281, R299	CHIP RES 1/10W 1% 10K 1608	
114	FN01150200	R51,R58,R178,R182,R291,R307	CHIP RES 1% 15K 1608 1/10W	
115	FN01220300	R53,R219,R302,R335,R336	CHIP RES 1/10W 1% 220K 1608	
116	FN01300100	R55	CHIP RES 1/10W 1% 3K 1608	
117	FN01560300	R65,R148,R334	CHIP RES 1/10W 1% 560K 1608	
118	FN01120000	R67,R72,R323	CHIP RES 1/10W 1% 120ohm 1608	
119	FN01120100	R69	CHIP RES 1/10W 1% 1.2K 1608	
120	FN01180100	R74,R75	CHIP RES 1/10W 1% 1.8K 1608	
121	FN01180200	R76,R144,R245	CHIP RES 1/10W 1% 18K 1608	
122	FN01010000	R77,R132,R165	CHIP RES 1/10W 1% 10ohm 1608	
123	FN01300000	R79,R80	CHIP RES 1/10W 1% 300ohm 1608	
124	FN01560200	R85,R180,181	CHIP RES 1/10W 1% 56Kohm 1608	
125	FN01330200	R98	CHIP RES 1/10W 1% 33K 1608	
126	FN01270200	R100,R119	CHIP RES 1/10W 1% 27K 1608	

LTEM	PART NO.	LOCATION	SPECIFICATION	REMARK
127	FN01100400	R121,R123,R124,R248	CHIP RES 1/10W 1% 1M 1608	
128	FN01056000	R126	CHIP RES 1/10W 1% 56ohm 1608	
129	FM01033900	R128	CHIP RES 1/10W 5% 3.3ohm 1608	
130	FN01120300	R129	CHIP RES 1/10W 1% 120K 1608	
131	FN01120200	R131,R189	CHIP RES 1/10W 1% 12K 1608	
132	FN01470200	R130,R259	CHIP RES 1/10W 1% 47K 1608	
133	FN01047000	R133,R166,R169,R174, R294,R296,R297	CHIP RES 1/10W 1% 47ohm 1608	
134	FN01390100	R139	CHIP RES 1/10W 1% 3K9 1608	
135	FN01820200	R176,R177	CHIP RES 1/10W 1% 82K 1608	
136	FM01022900	R206	CHIP RES 1/10W 5% 2.2ohm 1608	
137	FN01330100	R215,R262	CHIP RES 1/10W 1% 3K3 1608	
138	FN01560000	R247	CHIP RES 1/10W 1% 560ohm 1608	
139	FN01330000	R252	CHIP RES 1/10W 1% 330ohm 1608	
140	FN01680200	R256,R292,R310	CHIP RES 1/10W 1% 68K 1608	
141	FN01220000	R257	CHIP RES 1/10W 1% 220ohm 1608	
142	FN01220200	R260	CHIP RES 1/10W 1% 22K 1608	
143	FN01470100	R278,R289,R290	CHIP RES 1/10W 4.7Kohm 1% 1608	
144	FM01075900	R279	CHIP RES 1/10W 5% 7.5ohm 1608	
145	FN01470000	R305	CHIP RES 1/10W 1% 470ohm 1608	
146	FM01027200	R315	CHIP RES 1/10W 5% 2.7K 1608	
147	FN01330300	R324,R325	CHIP RES 1/10W 1% 330K 1608	
148	FM01082900	R338	CHIP RES 1/10W 5% 8.2ohm 1608	
149	FN01200100	R344	CHIP RES 1/10W 1% 2K 1608	
150	CF21019BD0	U1	DSP 1689 TQFP 100P LUCENT	
151	DA00900Y40	U3,U43	AMPLIFIER UPC2771TB SMD 6P NE	
152	HA03203450	U4,U6	FILTER B4697 SMD 8P SIEMENS	
153	HA032036U0	U8	FILTER LDB15C101A1800 SMD 6P MURATA	
154	DA00998YT0	U9	AMPLIFIER RF2173 SMD 16PRFMD	
155	JZ010058Z0	U10	RX SAW B4684 SS-38S1(A) 6P SIEMENS	
156	DE03471YT0	U11	SIMPOWER LTC1555CGN SSOP 16P LINEAR	
157	BG049079S0	U12	FLASH TE28F160C3B90 TSOP 48PINTEL	
158	BB076059Y0	U14	SRAM BS62LV2000STC-70 STSOP32P	
159	CA12003DD0	U15	CPU CPP-2 V3.4 TQFP 100P LUCENT	
160	CG01006YS0	U19	IC-RF W3000 TSSOP 14P LUCENT	
161	HA03203550	U20,U44	FILTER B4692 SMD 8P SIEMENS	
162	DA00980YA0	U21	OP AMP OPA343 SOT-23 5P BURRBROWN	
163	HA03203350	U22	FILTER B4635 SMD 6P SIEMENS	
164	HA032032U0	U23	FILTER LMC36-07A0501B SMD 10P MURATA	
165	DZ70610YR0	U24,U25	REGULATOR AME8802JEEV SOT-23 5P ANALOG	
166	DZ70810YS0	U26	REGULATOR TC1185-2.85VCT SOT-23 5P TELCOM	
167	DZ70620YE0	U27	REGULATOR ILC7081AIM5 2.85VSOT-23A IMPALA	
168	EN460006Y0	U29	VCO-PCN UCVE3X191A SMD 8P ALPS	
169	EN460007Y0	U30	VCO-GSM UCVE3X190A SMD 8P ALPS	
170	CG01007YS0	U31	IC-RF W3020 TQFPT 64P LUCENT	
171	DA00950YT0	U32	AMPLIFIER RF2140 SMD 16P RFMD	
172	HA03203850	U33	FILTER B4210 SMD 9P SIEMENS	
173	EN40000120	U35	TCXO 13MHz END3352B SMD 4P NDK	

LTEM	PART NO.	LOCATION	SPECIFICATION	REMARK
174	AR10140310	U38	IC TC74VHC14FT TSSOP 14PTOSHIBA	
175	AR11320310	U39	IC TC74VHC132FT TSSOP 14PTOSHIBA	
176	DE03520Y80	U41	L-VOLT DET RN5VT29 SOT23 5P RICOH	
177	EN460008Y0	U42	VCO-IF UCVE1X114A-540MHz SMD	
178	JZ040002Z0	U45	FILTER-RF B4686 SMD 6P SIEMENS	
179	JZ040008Z0	U46	FILTER-RF B4693 SMD 8P SIEMENS	
180	AR10245310	U48	IC TC74VHC245FT TSSOP 20PTOSHIBA	
181	HA03203750	U50	FILTER B4836 SMD 12P SIEMENS	
182	DE04008YP0	U53	INVERTER TC7SH04FU SSOP 5PTOSHIBA	
183	JC101010T0	U54	SW-ELECTRON MAX4541EUA 8 µMAX8P MAXIM	
184	AR10273310	U58	IC TC74VHC273FT TSSOP 20PTOSHIBA	
185	DZ80321YJ0	U59	REGULATOR TK71629SCLH SOT-23 5P TOKO	
186	EM432702Y0	X1	CRYSTAL 32.768KHz MC-206 SMD4P EPSON	
187	R3255003E0	ANTENNA	SPRING PLATE ANTENNA GD268M	
188	KG101703T0	NA	BOARD A758M 100x39mm	

2) Keyboard

LTEM	PART NO.	LOCATION	SPECIFICATION	REMARK
1	HJ02004760	BZ1	BUZZER SMT-8103C SMD SAMBU	
2	GM410423J0	C901,C915,C916,C925	CHIP MONO 1608 0.1U/16V KX MURATA	
3	GM410152J0	C902,C920	CHIP MONO 1608 100P/50V JN MURATA	
4	GM03351870	C903,C904,C905,C906	CHIP MONO 2012 3.3U/10V ZY TAIYO YUDEN	
5	GM410518J0	C907,C908,C909,C910,C911	CHIP MONO 1608 1U/10V ZY MURATA	
6	GM610152J0	C912,C913,C914	CHIP MONO 1005 100P/50V JN MURATA	
7	GM410052J0	C917	CHIP MONO 1608 10P/50V JN MURATA	
8	GM447052J0	C918,C919,C921,C922,C923	CHIP MONO 1608 47P/50V JN MURATA	
9	EJ15001340	D902	DIODE 1SS355 UMD2 P ROHM	
10	EL000359F0	D908,D909,D910,D911	LED LNJ310M6URA GREEN EVERLIGH	
11	EL000358F0	D912,D913,D914,D915, D918,D919	LED LNJ306G5URA GREEN SMD EVERLIGHT	
12	R301006860	J901	CONNECTOR DF12A(3.0)-40DS-0.5V (81) HIROSE	
13	HC10401240	L1,L2	CHIP BEAD BK 1608 HM121 TAIYO YUDEN	
14	EA95000740	Q901	TR NPN 2SC2411K SMT 3P ROHM	
15	EA95847020	Q902,Q903	TR NPN BC847BW SOT-323 3P IPS	
16	AR10574310	U901	IC 74VHC574FT(EL) TSSOP 20P TOSHIBA	
17	EJ15001240	U902,U903	DIODE IMN10 SMD 6P ROHM	
18	EJ15001640	U904	DIODE DA204U UMT3 P ROHM	
19	FM01010300	R901	CHIP RES 1/10W 5% 10K 1608	
20	FN21100200	R903,R904,R905	CHIP RES 1/16W 1% 10K 1005	
21	FM01020000	R907,R908	CHIP RES 1/10W 5% 20ohm 1608	
22	FM01022200	R909	CHIP RES 1/10W 5% 2.2K 1608	
23	FM21022100	R911	CHIP RES 1/16W 5% 220ohm 1005	
24	FP21104BC0	R912	CHIP ARRAY 1/16W 5% 100K 10 1608 RALEC	
25	FM21047200	R915	CHIP RES 1/16W 5% 4.7K 1005	
26	FM01010200	R916	CHIP RES 1/10W 5% 1K 1608	
27	FN01100300	R917,R918	CHIP RES 1/10W 1% 100K 1608	
28	FF900005B0	VR1,VR2	VARISTOR VA-A1608-5R5JJT SMD (CERATECH)	
29	KG101403X0	NA	BOARD A758K 100x39mm	

3) Mechanical/Electrical/Packing Parts

Item	Part No.	Specification	Remark
1	R393000930	Antenna (Black)	
2	R3870068A0	LCD Lens (In-Mold Grey)	
3	R395003660	Adhesive Tape for LCD Lens	
4	R3920024J0	Keypad (Silver White P+R)	
5	R401000260	Metal Dome for Keypad	
6	R2710150B0	Upper Case - Pearl White	
	R2710209B0	Upper Case - Dark Silver	
	R2710213B0	Upper Case - Blue	
7	R2720125B0	Lower Case (Dark Grey)	
8	R015403200	Rubber Cap (Dark Grey)	
9	R286002030	Shielding Cover	
10	R2820015B0	Button for Battery Eject	
11	R3250009V0	Button Spring for Battery Eject	
12	HJ00117460	Receiver	
13	HJ110029M0	Microphone	
14	JG100012C0	LCD Module	
15	R3970005C0	Nonwoven for Receiver	
16	R022051800	Backup Battery	
17	R4000004V0	Vibrator	
18	R382004090	Mylar	
19	R3850027H0	SIM Card Plate	
20	R382005080	Isolate Plate - Small for Screw Type M2x8L	
21	R382004880	Isolate Plate - Large for Lower Case	
22	HJ02004760	Buzzer	
23	R3010064M0	Carkit System Connector	
24	R3220026Q0	Screws - M2x8L	
25	R3220051Q0	Screws - M1.6x5.5L	
26	R3630029E0	Sponge for Receiver	
27	R3630065E0	Sponge for Buzzer	
28	R3630049G0	Sponge for Vibrator	
29	R3630069E0	Sponge for LCM	
30	R3630073E0	Sponge for Backup Battery	
31	R0274039X0	Pulp Modeling	

4) STANDARD ACCESSORIES

Item	Part No.	Specification
1	JB040042A0	Battery Pack - 600mAh Li-Ion
2	JB100083E0	Switching Travel Charger - Europe Version (Round Pin)

5) OPTIONAL ACCESSORIES

Item	Part No.	Specification
1		Headset
2		Cigar Lighter Charger
3		Mock up (Dummy)
4		Simple Handsfree Car Kit
5		Cable (for S/W Upgrading)
6		Cable (for RF Testing)